## SCIENCE AND CONSERVATION DIVISION

# FLORISTIC SURVEY AND MAPPING OF THE RIPARIAN AND HALOPHYTE DOMINATED COMMUNITIES ON THE FORTESCUE MARSH (*MARTUYITHA*), WESTERN AUSTRALIA

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## Abstract

Saline wetlands are relatively rare features in the Pilbara of Western Australia, and the Fortescue Marsh is the largest ephemeral wetland in the region which is episodically inundated following cyclonic and sporadic heavy rainfall events. This wetland is of high conservation significance by virtue of the diversity of habitats, from saline flood plains to semi-permanent/permanent freshwater pools, saltbush shrublands and woodlands, and the diversity and range of fauna these habitats support. It is also in an area of pastoralism and expanding mining activity. A flora and vegetation survey was conducted on Fortescue Marsh with the aims of documenting the flora and identifying the halophyte-dominated communities on this arid-zone saline wetland complex for the purposes of generating a vegetation map of the Marsh Land System.

A total of 352 taxa (species, subspecies and varieties) from 49 families were identified from plots and additional opportunistic collections on/around the Fortescue Marsh. Fourteen taxa of state priority conservation significance were recorded: two of these are new records for the survey area and two species are new taxa (*Dysphania congestiflora* S.J.*Dillon* & A.S.*Markey* and *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen 9702). A further 18 species were new species records for the Fortescue Marsh, 11 of these are significant range extensions (> 100 km) from their previously known distribution.

A community classification was generated using mid-point cover value classes of flora found in 117 plots for the 2014 winter-spring season. These were classified into 12 major floristic groups, eight of which were further subdivided into subgroups, ultimately amounting to a total of 21 community units. These were broadly separated into the categories of frequently inundated *Tecticornia/Muellerolimon* communities in the Marsh interior, samphire/shrubland communities occurring from the Marsh interior to margins, freshwater / alluvial Marsh margin communities, communities associated with freshwater surface - subsurface flow on the Fortescue Marsh margin, and non-Marsh communities (located off the Marsh Land System).

A vegetation map covering the entire Fortescue Marsh system was generated from this plot-based community classification, which was facilitated by ground-truthing and supplementary photo points and using high resolution aerial photography. Additional vegetation units abutting onto the margins of the Fortescue Marsh were described and mapped which were supplementary to the community analysis but still identified for the purposes of vegetation mapping and for future sampling and community analysis. It is anticipated that this vegetation map will facilitate in the management of conservation values of this significant wetland.

**Keywords** – Pilbara, Fortescue Marsh, floristic survey, wetland, samphires, vegetation mapping

# 1. Introduction

The Fortescue Marsh (herein refered to as the Marsh) is the largest ephemeral wetland in the Pilbara region and is recognised as nationally important (Environment Australia 2001). A site of high biological and cultural significance, the hydrology of the Marsh includes a complex of alluvial aquifers and ground water systems. The main body of the Marsh supports extensive halophytic plant communities dominated by *Tecticornia* shrublands, along with localised features including groundwater seeps, wetlands such as river and creek channels and claypans. Increased resource development surrounding the Marsh, and the need to assess and manage potential impacts to the Marsh environment has driven collaborative efforts to increase understanding of the Marsh's hydrology and biology (e.g. Dogramaci et al. 2012, 2015, Moir-Barnetson 2014, Equinox Environmental Pty Ltd 2013, Rouillard et al. 2015a, 2015b).

A number of floristic surveys have addressed parts of the Fortescue Marsh (see Equinox Environmental Pty Ltd 2013 and references therein). However, there has been no detailed flora survey which has encompassed the entire extend of this landform. This current study aims to produce a compositionally based vegetation map of the Marsh in addition to an assessment of the conservation values of the Marsh flora and vegetation communities. The mapping and associated data will underpin both management planning and assessment for resource development and contribute to management of feral herbivores, introduced predators, weeds and conservation significant flora and fauna.

## *1.1 Study Area*

The Fortescue Marsh (herein referred to as either Fortescue Marsh or the Marsh) is an extensive, elongate wetland located in the Fortescue Valley, c. 100 km NNW of Newman in the Pilbara region of Western Australia (Figure 1) and located between Roy Hill (-22.602° S, 119.954° E) and Goodiadarrie Hills (22.352° S, 118.997° E). It consists of saline plains and lake beds some 100 km long and ranging from between 5 km to 20 km wide (Figure 1), and formed as a consequence of impeded flow of the Fortescue River westwards through the Fortescue Valley by the Goodiadarrie Hills, which marks the terminus of the Upper Fortescue River. The approximate area of the Marsh is c. 1000 $km^2$ and elevation ranging between 400–405m ASL (Skrzypek *et al.* 2013, Roullaird *et al.* 2016).

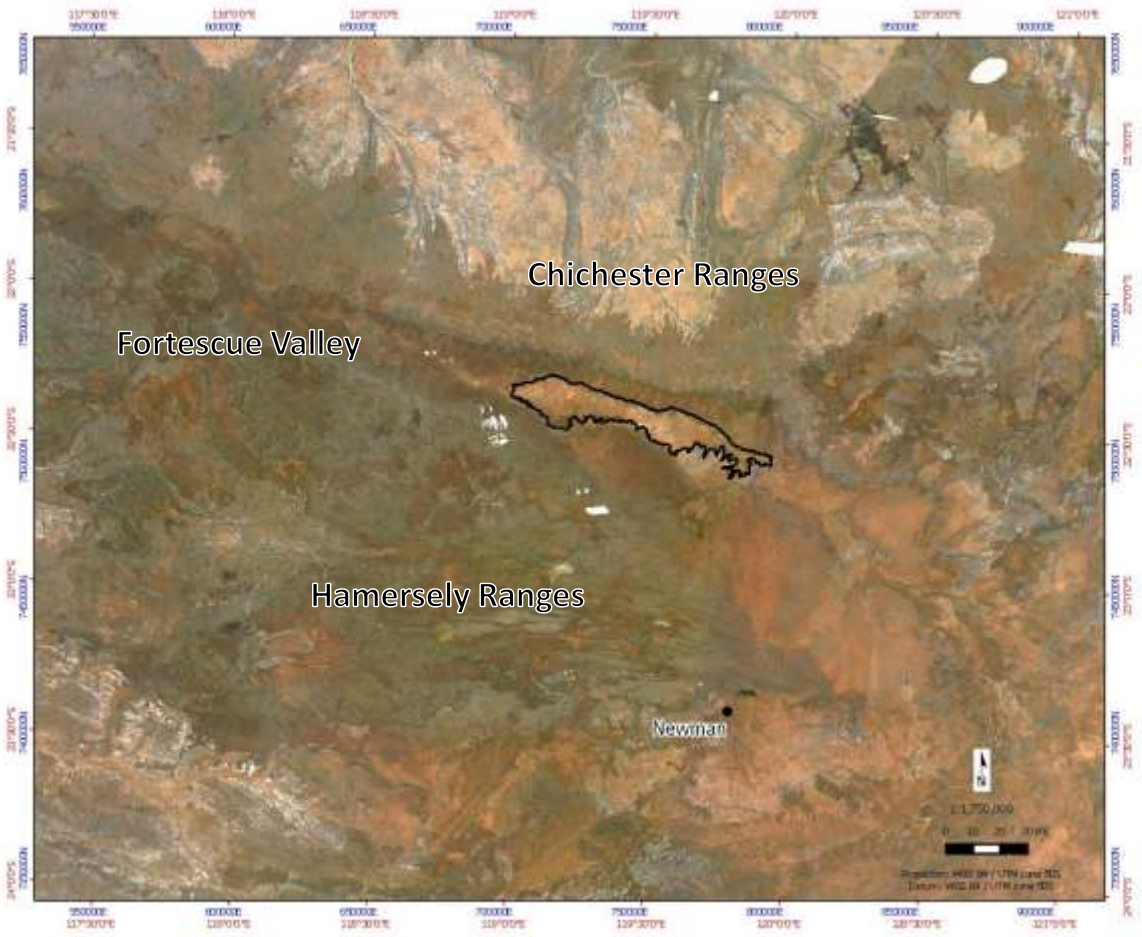



**Figure 1:** Location of the Fortescue Marsh (black outline) relative to surrounding Fortescue Valley IBRA subregion and nearby landforms.

### *1.2 Climate*

The Fortescue Marsh lies in semi-arid region, in a hot, persistently dry desert climate that experiences hot, dry summers and mild winters, and is subject to prolonged droughts interspersed by occasional flooding (George *et al.* 2009, Hennig 2004, Roullaird *et al.* 2015). Mean daily maximum temperatures for Newman range from 24° C in winter to 39° C in summer (BOM 2016). As is typical for the Pilbara, most rain falls in summer with cyclonic rainfall and thunderstorm activity (Hennig 2004, Roullaird *et al.* 2015). Rainfall in the region exhibits high inter-annual variability (Sudmeyer 2016). The average annual rainfall for Marillana Station (between 1936–2016) is 322 mm/yr, and rainfall records indicate that the wettest months are December–March, when 85% of rain falls, and the driest months are September–October (BOM 2016, Dogramaci *et al.* 2012, Skryzypek *et al.* 2013). Winter rains may occur in some years, falling between April–September (Dogramaci *et al.* 2012). Aridity in this region results from a combination of low rainfall and high rates of evaporation, where the >3000 mm annual pan evaporation rate exceeds by a factor of 10 the annual average rainfall (BOM 2016, Dogramaci *et al.* 2012, Skryzypek *et al.* 2013). This affects groundwater recharge and surface water retention time (Dogramaci *et al.* 2012).

### *1.3 Geology and geomorphology*

The Fortescue Marsh lies in the Upper Fortescue Valley, which is a broad, flat, east–west trending valley separating the Chichester and Hamersley Ranges (Figure 1). In the wider geological context, this region lies in the Archean–Proterozoic Hamersley Basin of the Pilbara Craton, in association with the Hamersley Group geological formation (Thorne & Tyler 1997). The Fortescue Marsh overlies the Wittenoom Formation (shale and dolomites), between the exposed banded iron formation (BIF) of the Brockman Iron Formation and both the Wittenoom and Marra Mamba Iron Formations, which are associated with the Hamersley and Chichester Ranges respectively (Skrzypek *et al.* 2013, Thorne & Tyler 1997). The present valley overlies a Cainozoic palaeovalley with extensive infill of Tertiary sediments that comprise the Oakover Formation (Skrzypek *et al.* 2013, Thorne & Tyler 1997). The Fortescue Marsh lies itself within the Fortescue River Basin, and is filled to a depth of c. 50 m with Quaternary alluvium (unconsolidated silt, sand, and gravel) (Skrzypek *et al.* 2013, Thorne & Tyler 1997). Extensive sheets of Cainozoic calcrete (carbonate) dominate the southern margin of the Fortescue Marsh as well as occurring as smaller, isolated fragments along the northern margin. North (extending to the flanks of the Chichester Range) and south of the river basin are extensive, gently sloping plains and low slopes of Quaternary colluvium and alluvium sheetwash (red-brown sandy and clayey soil), which are dissected by numerous drainage lines (Thorne & Tyler 1997). At the far west end of the Fortescue Marsh are the Goodiadarrie Hills which, together with four small hills situated nearby in the Marsh, are composed of siliceous breccia caprock over dolomites and with colluvial scree and talus deposits on their lower slopes (Thorne & Tyler 1997).

Soils of the Fortescue Marsh saline flood plains and lakes are deep, alkaline, gypsum-rich and saline non-cracking clays (Payne 2004), where evaporation of surface pools and shallow groundwater results in precipitates of minerals such as calcite, gypsum and halite (Dogramaci *et al.* 2015). Flood plain soils are deep non-cracking clays (Payne 2004).

### *1.4 Landforms*

Payne (2004) identified seven landforms for the Fortescue Marsh Land System (Table 1). Most of the Fortescue Marsh area consists of saline flood plains and flood plains, with bare lake beds at the lowest elevations (Payne 2004). In the eastern part of the Fortescue Marsh, the Fortescue River forms freshwater channels, several of which persist as freshwater channels and pools. One main channel links two main lake beds in the east of the Marsh, and supports semi-permanent/permanent freshwater pools (*yintas* in the Nyiyaparli language). These pools (Moorimoordinina and 14 Mile Pool), remain filled through all but the driest years. Distinct channels are absent on the wide saline flood plains and lake beds. Bordering the Marsh are a range of landforms, notably expanses of low calcrete platforms, alluvial and colluvial plains, major and minor alluvial drainage systems and stony plains and hills.

### *1.5 Hydrology*

The Upper Fortescue Catchment terminates in the Fortescue Marsh basin with little connection to the Lower Fortescue Catchment either by surface or groundwater flow (Skryzypek *et al.* 2013). Water enters the Fortescue Marsh from direct rainfall, surface runoff from the Upper Fortescue catchment, and from groundwater sources (Dogramaci *et al.* 2012, Skryzypek *et al.* 2013, Skrzypek *et al*. 2016). This includes inflows from the Fortescue River, Weeli Wolli and Kulkinbah Creeks and other tributaries draining surrounding ranges. Deeply scoured pools in these ephemeral river channels retain freshwater during dry periods (Dogramaci *et al.* 2012). Episodic inundation of the Marsh follows cyclonic or heavy autumn–winter rainfall events, where pools, lake beds and surrounding flood plains are filled with surface water. The area filled varies greatly between years from total dryness to covering the total available surface area (>1100 $km^2$) (Skryzypek *et al.* 2013, Rouillard *et al.* 2015a, Roullaird *et al.* 2016, Skrzypek *et al*. 2016).

A model reconstructing a century of filling events between 1912 and 2012 has calculated that the Fortescue Marsh has been dry for 32% of those years, with prolonged periods of drought (up to 4 consecutive years). Almost 25% were large flood years (surface water extent >300 $km^2$), and 7% have been extremely wet and with prolonged periods of inundation (for up to 12 months) (Rouillard *et al.* 2015a, Roullaird *et al.* 2015b). The duration, severity and frequency of Marsh inundations between 1999 and 2006 have been above the averages calculated for the past century (Rouillard *et al.* 2015a, Roullaird *et al.* 2015b, Roullaird *et al.* 2016). Changes in the flooding regime over the past 20 years suggest that the frequency and intensity of extreme rainfall events and tropical cyclones are increasing for the region and this has implications for the Fortescue Marsh hydrology and environment (Rouillard *et al.* 2015a, Rouillard *et al.* 2015b, Roullaird *et al.* 2016, Cullen & Grierson 2007, 2009).

It is estimated that for the Marsh to spill over into the lower Fortescue River, the level of inundation would have to reach the 410 m ASL elevation (Skrzypek *et al.* 2013, Roullaird *et al.* 2016). The most extensive inundation event was in 2000 (>1000 $km^2$) (Roullaird *et al.* 2015, Roullaird *et al.* 2016), and two major fill events occurred in 2012 and 2014 which were equal to c. 50% of the total area of the Marsh (c. 1100 $km^2$) (Skrzypek *et al*. 2016).

The Fortescue Marsh wetland is saline as a consequence of internal drainage into a basin in a hot, arid climate. The floodplains fill with freshwater which progressively become saline due to evaporation (Skryzypek *et al.* 2013). Shallow groundwater (0–20 m depth) and surface water is generally fresh to brackish (Skryzypek *et al.* 2013, Skrzypek *et al*. 2016). These shallow groundwaters are being found to become hypersaline towards the Marsh interior (Moir-Barnetson 2014). These shallow aquifers are recharged by rainwater following high rainfall events, but low rainfall events have little impact on

groundwater and surface pools due to high rates of evaporation (Dogramaci *et al.* 2012, Skrzypek *et al*. 2016). There are a number of significant alluvial aquifers which discharge freshwater into the Fortescue Marsh (e.g. Weeli Wolli Creek and Fortescue River alluvial aquifers) (Dogramaci *et al.* 2015). A deep (>50 m), hypersaline (>100 $gL^{-1}$) alluvium aquifer underlies the Fortescue Marsh, which is likely eventually recharged from the surface following cycles of wetting and evaporation. Isotopic analyses suggest that the deep aquifer salt load has been accumulating for 40,000–700,000 years and reflects a mix of modern and old recharge (Dogramaci *et al.* 2012, Skryzypek *et al.* 2013). Fluctuating groundwater conditions at depth and surface evaporation results in calcite and gypsum deposits and dolomite dissolution (Dogramaci *et al.* 2012, Skryzypek *et al.* 2013).

### *1.6 Land Use History*

Evidence of human occupation of the region and the traditional use of the Fortescue Marsh wetlands (known as *Martuyitha* in the local Nyiyaparli language) resources dates back 40,000 years, and are of high cultural significance to the Nyiyaparli people (Dias & Rapley 2014, Karlka Nyiyaparli Aboriginal Corporation *et al.* 2015). Over the past century, the main industries on or adjacent to the Fortescue Marsh have been pastoralism and mining. Four pastoral stations occur over the area (Hillside, Marillana, Mulga Downs and Roy Hill), which have run sheep and more recently, cattle. Both bores and the free-flowing freshwater channels of the Marsh serve as unfenced stock watering points. Until 2015, cattle have had free access to the full extent of the Marsh, with activity (grazing, trampling) highest around freshwater channels and onto the Marsh when feed is available. Following the July 1$^{st}$ 2015 Rangeland Reform Process, pastoral leases were relinquished from portions of the four stations abutting onto the Marsh and shifted into an area (766 $km^2$) of proposed conservation estate under the joint management of the Conservation Commission and the Western Australia Department of Parks and Wildlife under an Indigenous Land Use Agreement (Environmental Protection Authority 2013, Shepherd & van Leeuwen 2011, Bell *et al.* 2014).

Currently three mines (Cloud Break and Christmas Creek (Fortescue Metals Group (FMG) Limited) and Roy Hill project (Hancock Prospecting Pty Ltd)) are operating on the north of the Marsh extracting iron ore from the Marra Mamba Iron Formations at the foothills of the Chichester Ranges. A number of mines are operating on the Hamersley Ranges south of Fortescue valley. Mining operations in the Chichester Ranges involve mine dewatering coupled with re-injection into aquifers adjacent to or on the Marsh. Dewatering operations in the Hamersley Ranges with disposal into Weeli Wollie Creek has increased surface flows into the southwestern edge of the Marsh. There are concerns that these dewatering disposal operations have been having an effect on the surface and groundwater hydrological regimes, thereby altering groundwater levels, quality and flow, which has implications for the samphire vegetation communities on the Fortescue Marsh (Fortescue Metals Group Ltd 2014, Department of Water 2010).

Historical changes to river flows into the Fortescue River and Fortescue Marsh have also followed the construction of the Opthalmia Dam near Newman. Built in 1981 for mining and township supplies, it receives 14.5% of the Upper Fortescue catchment. Despite this reduction in river flows, impacts on riparian vegetation where the river enters the Marsh appear to be minimal (Payne & Mitchell 1999, Rouillard *et al.* 2015a).

### *1.7 Conservation Values*

The Fortescue Marsh is the largest and most significant ephemeral wetland in the Pilbara region, where inland saline habitats and salt lakes are few (Shepherd & van Leeuwen 2011). It is recognised in the Directory of Important Wetlands of Australia (Environment Australia 2001) as a Wetland of National Significance (Site Code: WA066) since it fulfils the following criteria: 1: is a good example of a wetland type occurring within a biogeographic region in Australia, 2: plays an important ecological or hydrological role in the natural functioning of a major wetland system, 3: is important as the habitat for animal taxa at a vulnerable stage in their life cycles, or provides a refuge during adverse conditions and 4: is of outstanding historical or cultural significance (Environment Australia 2001, Kendrick 2001). The Fortescue Marsh has been classified by DIWA as having two wetland types: (B6): seasonal/intermittent freshwater lakes (>8 ha), floodplain lakes and (B4) riverine floodplains (river flats, flooded river basins, seasonally flooded grassland). It encompasses both saltbush communities and riparian zone vegetation ecosystems (Department of the Environment and Heritage 2001, Kendrick 2001). The Fortescue Marsh is recognised nationally as an Important Bird Area (IBA) for its significance as a refuge, habitat and feeding area for wildlife, particularly for waterbirds following inundation events (Bell *et al.* 2014, Trainor *et al.* 2016). The Fortescue Marsh (Marsh Land System) is recognised by the Western Australian Government as a Priority 1 Ecological Community (PEC) based on this importance as a waterbird refuge and highly diverse ecosystem of fringing Mulga woodlands, samphire shrublands and groundwater dependant riparian ecosystems. This listing also recognised the rich diversity of restricted aquatic and terrestrial invertebrates, records of the presence of several threatened vertebrate species and species of endemic or near-endemic *Eremophila*, *Tecticornia*, and populations of other priority flora (Department of Parks and Wildlife 2014a).

### *1.8 Vegetation*

The Fortescue Marsh dominates the Fortescue Plains subregion (PIL02) of the Pilbara IBRA region (Kendrick 2001, Department of the Environment 2013), a physiographic unit congruent with the Fortescue Valley physiographic unit of the Fortescue Botanical District (in the Eremaean Province) of Beard (1975, 1990). The Marsh itself was mapped largely as samphire vegetation surrounded by *Triodia* grasslands, and *Eucalyptus* and Mulga woodlands by Beard (1975). The vegetation of the entire Fortescue Marsh in greater detail was most recently addressed as part of the Pilbara regional rangeland survey by van Vreeswyk *et al.* (2004). In addition, the vegetation of parts of the Fortescue Marsh has been described by Payne & Mitchell (1999), Lyons (2015), and by various environmental

surveys for resource projects (Mattiske Consulting 2005, ENV Australia Pty Ltd 2009, ENV Australia Pty Ltd 2013, Ecologia Environment 2009a, Equinox Environmental Pty Ltd 2013, Fortescue Metals Group Ltd 2011).

The Pilbara regional survey of rangelands for resource evaluation and land classification defined 104 land systems (Payne 2004); these units being a combination of soil, geology, drainage, landforms and vegetation. Most of the Fortescue Marsh is covered by the Marsh Land System, which supports samphire shrublands, saltwater couch grasslands and halophytic shrublands (Table 1). The two major adjoining Land Systems are the Calcrete Land System, forming an extensive rocky plain along the southern boundary of the marsh, and the Cowra Land System along the northern edge of the Marsh. Other minor Land System occurrences include the Adrian, Christmas, Coolibah, Turee, Fortescue and Warrie (Table 2).

Vegetation in the Fortescue Marsh lake beds and saline floodplains has to cope with climatic extremes of hot, dry-drought conditions, punctuated by periods of inundation. As the deep hypersaline groundwater does not come into contact with shallow aquifers and surface waters, these waters are largely fresh and become brackish through evaporation (Roullaird *et al.* 2015, Skryzypek *et al.* 2013). With extreme flood events, inundation depths can be >0.5 m and duration of some level of inundation can persist for 1 year (Roullaird *et al.* 2015). For riparian vegetation, this can entail pulses of floodwaters. The main vegetation of the Fortescue Marsh are *Tecticornia* spp., Lignum (*Duma florulenta*) and False Lignum (*Muellerolimon salicorniaceum*) shrublands, which variably tolerate the extreme seasonality of water availability and salinity of the floods plains (Moir-Barnetson 2014, Moir-Barnetson *et al.* 2016). Species zonation into the saline flood plains of the Marsh is driven by inundation frequency and duration, soil water and salinity and depth to the watertable (Moir-Barnetson 2014, Moir-Barnetson *et al.* 2016, Equinox Environmental Pty Ltd 2013). A more diverse range of shrublands and shrubby grasslands dominates the Marsh margins (Table 2). *Acacia* woodlands dominate colluvial and alluvial plains on the Marsh periphery (Payne 2004, George *et al.* 2009)

To date, there has been limited mapping of the vegetation on the Fortescue Marsh. Mapping for the Hancock Prospecting Roy Hill project covers an area of floodplains north-east of the Marsh Land System (G&G Environmental Pty Ltd. (2009).), and the Fortescue Marsh has been mapped in an area south of Christmas Creek mine site (Biota 2004, Mattiske Consulting 2005, Mattiske Consulting 2007, ENV Australia Pty Ltd 2013).

**Table 1: Marsh Land System of Payne (2004) (*dominant landform in bold text)**

| Landform* | Vegetation | Site Types (Vegetation types) (van Vreeswyk & Payne 2004) |
|---|---|---|
| Stony plains on outer margins | Very scattered low *Tecticornia* spp., *Eremophila* sp. (*spongiocarpa*), *Frankenia* sp. and *Atriplex bunburyana*. Scattered shrublands with *Acacia xiphophylla*. | Plain mixed halophyte shrubland: Plain snakewood shrubland with chenopods low shrubs |
| Alluvial fans and Drainage floors | Tall shrublands with *Acacia coriacea*, *Vachellia farnesiana* and *Acacia sclerosperma*, over *Atriplex* and *Maireana* spp. and grass (including *Cenchrus ciliaris*) | Plain chenopod grassy shrubland. |
| Gilgai plains | Scattered low shrublands *of Atriplex bunburyana*, *A. amnicola*. Occasional thickets of *Melaleuca* sp. shrubs. | Plain mixed halophyte shrubland: Drainage melaleuca shrubland |
| **Flood Plains** | Shrubby grasslands of *Sporobolus virginicus* in patches of as continuous swards with *Muellerolimon salicorniaceum* and *Duma* (*Muehlenbeckia) florulenta*. Grassy low shrublands with *Atriplex bunburyana.* | Saline plain sporobolus grassland.<br>Plain chenopod grassy shrubland. |
| **Saline flood plains and Lakebeds** | Low shrublands of *Tecticornia* spp. often with distinct zonation of species. Some extensive areas with no perennial vegetation. | Plain samphire shrubland |
| Kopi banks | Not sampled. | |
| Channels and Waterholes | Fringing tall shrublands with *Acacia ampliceps*, *Vachellia farnesiana* and scattered trees of *Eucalyptus camaldulensis* and *E. victrix* around water holes. | |

**Table 2: Peripheral Land Systems bordering Fortescue Marsh Land System (Payne 2004)**

| Land System | Landform and Vegetation |
|---|---|
| Calcrete | Low calcrete platforms and plains supporting shrubby hard-spinifex grassland |
| Cowra | Fringing plains supporting snakewood and Mulga shrublands with some halophytic undershrubs |
| Warri | Low calcrete platforms and plains supporting Mulga and cassia shrublands |
| Adrian | Stony plains with low silcrete hills supporting hard spinifex grasslands (Goodiadarrie Hills) |
| Turee | Stony alluvial plains with gilgaied and non-gilgaied surfaces supporting tussock grasslands and grassy shrublands (Mulga and snakewood) |
| Christmas | Stony alluvial plains supporting Mulga and snakewood shrublands with sparse tussock grasses |
| Marillana | Gravelly plains with large drainage foci and unchannelled drainage tracts support snakewood shrublands and grassy Mulga shrublands |
| Fortescue | Alluvial plains and flood plains supporting grassy woodlands and shrublands, and tussock grasslands |

# 2. Methods

A total of 128 permanent vegetation plots were established over the extent of the Fortescue Marsh (Figure 2, Appendix 1). Plot corners were marked with plastic posts and an additional steel post was used to mark one corner. Locations were recorded using a handheld Garmin 76cs GPS receiver. Of these 128 plots, 126 were mostly square 2500 $m^2$ (50 m × 50 m) plots, with two 500 $m^2$ (5 × 100 m) linear plots established along narrow, elongate riparian zones. Plot area conforms to the Pilbara Biodiversity Survey (McKenzie *et al.* 2009). Sixty five plots were established in 2013 and a further 63 were established in 2014. The majority of the 2013 plots (83%) were rescored the following winter–spring, except 11 sites which were too inundated to rescore and/or inaccessible (Appendix 1).

Plant collections were made both within and adjacent to these plots and opportunistically at other locations around the Fortescue Marsh.

## *2.1 Site Selection*

Plots were located to cover the range of community variation observed across the Marsh: from the shrubland communities on calcrete and colluvium/alluvium on the edges of the Fortescue Marsh to the halophyte-dominated communities in the Marsh interior, thereby capturing vegetation zonation presumably driven by substrate, inundation history and elevation. Most of the 128 permanent plots were established within the Marsh Land System to cover the range of halophyte-dominated samphire vegetation. Relatively fewer sites were located in other vegetation communities found in the adjoining Land Systems of Payne (2004) for comparative purposes (Appendix 1). Accessible parts of the Fortescue Marsh were traversed by vehicle (4WD or quadbike) and by foot (Figure 1). Sites were deliberately placed to capture variation in vegetation composition, structure, substrate and zonation along multiple transects from the margins to interior of the landform. Aerial photography aided site selection, but many parts of the Marsh were inaccessible.

## *2.2 Marsh Conditions at Time of Survey*

Fieldwork was conducted over two winters, between July–September 2013 and June–September 2014. The first year of survey was one year on from the 2012 inundation event from Cyclone Heidi, which filled c. 480 $km^2$ of the Marsh (Skrzypek *et al*. 2016). While the Marsh lake beds and saline flood plains were dry by June 2013, winter rainfalls dominated the autumn–winter months and good flowering was observed on the margins of the Marsh and surrounding shrublands and woodlands. Cyclonic and heavy rainfall events on the Marsh and catchment over the summer of 2013–2014 filled c. 561 $km^2$ of the Marsh - equivalent to the post-cyclone Heidi event of 2012. This was equal to c. 50% of the total area of the Marsh, and partially-filled lake beds remained by the start of survey in June 2014 (Skrzypek *et al*. 2016). This restricted access to sites within and around the lake beds in

2014 and had submerged stands of samphire and false lignum vegetation across much of the Marsh. Conversely, the 2014 autumn–winter was dry, and flowering was relatively poor for vegetation on the Marsh margins and surrounding land systems.

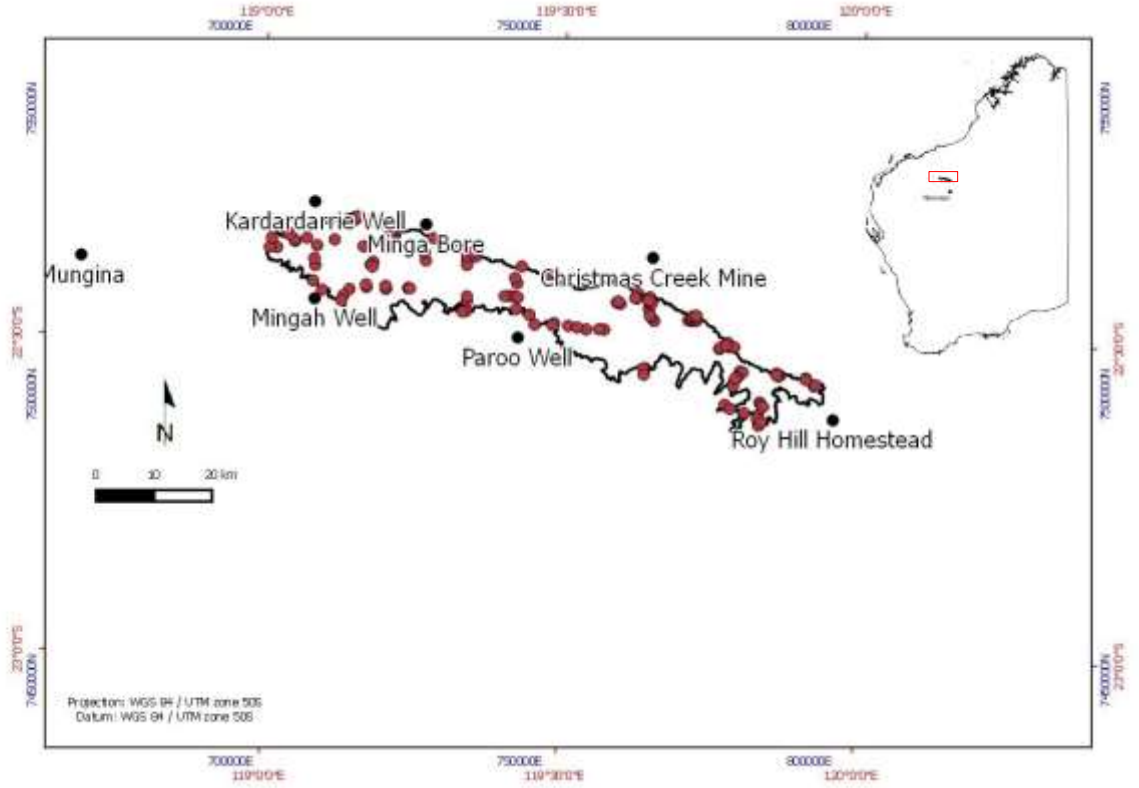



**Figure 2:** Location of Fortescue Marsh survey area (outline of Marsh Land System), and placement of 128 survey plots relative to reference features (inset: Location of Fortescue Marsh in Western Australia).

### *2.3 Soils*

For each plot, a topsoil (10–15 cm) sample was bulked from 20 scoops taken at evenly spaced points over the plot, yielding a total sample of 1–2 kg. Other site physical parameters (field litter and bare ground cover, exposed bedrock surficial rock cover, surficial rock size, soil colour) were noted in the field using the methods of McDonald *et al.* (1998). Soils were dried at 60° C and sieved; the 2 mm fraction was later analysed at the Chemistry Centre of Western Australia using methods detailed in Markey & Dillon (2011), to determine following parameters: concentrations of 18 elements (P, K, Ca, Na, Mg, B, S, Cu, Fe, Mn, Mo, Al, As, Co, Cd, Ni, Pb and Zn), total soil N (%), soil pH($CaCl_2$), electrical conductivity ($EC_{1:5}$), effective Cation Exchange Capacity (eCEC), soil texture (sand, silt, clay

particle size fractions), gypsum content and salt content (NaCl calculated from Na). Organic C was not analysed as this tends to be low in saline wetlands (Lyons 2015) and correlated with total N.

### *2.4 Classification and Multivariate Analyses*

Vegetation cover-abundance for all species was recorded in the field as visual estimates of both projected % cover of above-ground canopy within the plot, and converted to a category on a five-point cover-abundance scale (1=<1%, 2=1–10%, 3=10–30%, 4=30–70%, 5=70–100%) (McDonald *et al.* 1998). Cover-abundance values were recorded by the same one observer for both years and confirmed from annual plot photographs in order to reconcile major annual discrepancies to either a consistent estimate for perennial taxa whose cover had obviously not changed, or to verifying a change in annual variation in cover when evident, and for consistency in cover estimates between sites and years. Although visual estimates are subjective and may not reflect actual cover (Cheal 2008, Wilson 2010, Wintle *et al.* 2013), they were used to add weighting to reflect species' cover-abundances in the multivariate analyses. The vegetation is structurally simple with only two or three recognisable vegetation layers (shrubs over herbs and/or grasses), so all layers were included in analysis. Plant collections were identified at least to species at the Western Australian Herbarium, where vouchers representative of species will be lodged in the main collections. Species were categorised by lifeform (perennial, short-lived perennial, geophyte and annual) using observations, herbarium records and from the taxonomic literature (Florabase 1998-, van Vreeswyk 2004).

Multivariate analyses and data exploration were executed using PRIMER version 7 (Clarke & Warwick 2001). Cover values were converted to corresponding midpoint cover values (0.5%, 5%, 20%, 50% and 85%) and, after trialling several options, the square root transformation was selected as this is a moderate transformation which doesn't overly up-weigh rare or infrequent species. This aspect was considered important for this mapping exercise largely reliant on aerial imagery.

Statistical analyses were run using PRIMER-E & PERMANOVA+ software. All three datasets were reduced to a Site by Species resemblance matrix using the Bray & Curtis dissimilarity measure (Bray & Curtis 1958). Cluster Analysis was used to resolve vegetation communities among sites (site groups), using flexible beta method of cluster analysis (Lance & Williams 1967, Sneath & Sokal 1973), with the $\beta$-value set at -0.1. A similarity profile permutation test (SIMPROF) was implemented on site classification to test statistical support of branches (Clarke & Warwick 2001, Clark *et al.* 2008). Species classifications were run using the same resemblance matrices and classification parameters for the Site classifications, and both classifications were combined to produce a two way table of the Site by Species data matrix, ordered according to their groupings (Appendix 3). The SIMPER routine in PRIMER was used to identify species contributing to community type (where average dissimilarity between groups was decomposed into similarity contributions by individual species (Clarke & Warwick 2001).

Bubbleplots were used to visualise raw environmental data superimposed on an ordination of floristic data. Soil variables were examined for heteroscedasticity and intercorrelation before analysis, and a single variable was retained for highly intercorrelated ($p > 0.9$) soil variables. Highly skewed variables were transformed either by square root- or log-transformation and the resulting variable matrix normalised prior to analysis. The BEST (Bio-Env + Stepwise) procedure in PRIMER was used to find the best subset of environmental variables with highest correlation to the site vegetation compositional similarity (Clarke and Ainsworth 1993, Clark & Gorley 2015). This analysis searches for maximum rank correlations (Spearman's) between the Bray-Curtis similarity matrix of species cover abundance for the sites and subsets of the Euclidean distance matrix of site environmental variables. It is an explorative method used to identify a set of environmental variables correlated with community composition.

### *2.5 Vegetation Mapping*

Two vegetation maps were produced: the boundary of the Marsh Land System and the extent and distribution of individual Marsh Land System vegetation communities. These were achieved primarily by using a combination of high resolution, low altitude aerial imagery and field survey. The Marsh Land System boundary was redrawn to improve its accuracy, this boundary being delineated at the outer limit of samphire shrublands discernible from aerial imagery.

Aerial Photography Interpretation was used to generate vegetation maps (Lewis & Phinn 2011, Lewis *et al.* 2013, Morgan *et al.* 2010), where polygons encircling uniform vegetation types were manually overlain onto aerial orthoimages. Quantum Geographical Information System (QGIS) software (using both QGIS DPaW Edition and QGIS V. 2.18) was used for the interpretation of digitised, georeferenced spatial imagery and the generation of map layers (QGIS Development Team 2016). Four sets of high resolution colour orthoimages (generously provided by Fortescue Metals Group Limited) were used for aerial photography interpretation. These were produced from digitised, orthorectified and georeferenced colour aerial photographs, and covered approximately an area of 150 $km^2$ over the Fortescue Marsh. These four sets of orthoimages were taken in July 2010 (40 cm resolution, colour (RGB), photographic scale of 1:25000), April 2012 (40 cm resolution, colour infrared (CIR), photographic scale of 1:25000), June 2014 (15 cm resolution, colour (RGB)), and June 2015 (15 cm resolution, colour (RGB). The clearest details of vegetation were found for the June 2015 orthoimages, which were discernible down to distances of 30 m. Lower resolution orthophotos (5 m) taken in August 2004 (Landgate, Government of Western Australia) were used for general reference and for areas not covered by the high resolution orthoimages.

**Photopoints:** Where possible, georeferenced photopoints were taken on the ground along with additional vegetation notes at >200 points across the Fortescue Marsh which were accessed by vehicle or foot (Figure 3). Vegetation community type was estimated for each site based on visual

inspect and dominant taxa, and these were used to draw spatial boundaries of the vegetation communities on the Marsh.

**Additional Geospatial GIS datasets:** Three geospatial dataset were acquired for mapping purposes. A Digital Elevational Model (DEM) (0.1 m vertical accuracy (RMS) LiDAR Survey DEM, 2010) shapefile was provided by Fortescue Metals Group Ltd. Alex Rouillard (University of Western Australia, University of Copenhagen) provided a 410 m contour shapefile which defined the outer limit of the Fortescue Marsh floodplain area, which has an area of ~1300 $km^2$ (Rouillard *et al.* 2015a, 2015b). A digitised 1:250,000 Geology map (sheet: ROY HILL SF5012) was obtained from Geoscience Australia (http://www.geoscience.gov.au). A Digital Elevational Model (DEM) was obtained from Geoscience Australia (http://www.ga.gov.au/) with the following criteria: 1second DMH DEM layer – SRTM DEMH. Vertical elevation averaged over the cell. 1 arc-second 1 degree, 2 m intervals, horizontal elevation 25 m. 30 m intervals.

**Inundation Frequency and Duration.** Shapefiles of inundation history (i.e. duration and frequency of surface water expression – i.e. flooding) were provided by Alex Roullaird. The maximum extent of inundation and surface water/wetness was collated from Landsat imagery for a period between 1988 and 2012, where surface water or wetness was and methodology is discussed in Roullaird *et al.* (2015).

**Camera Trap Images**. These were a valuable source of additional photopoints for locations that were not able to be accessed during the flora survey. These images were provided by the Department of Parks and Wildlife Fortescue Marsh feral cat baiting program (Clausen 2015). Survey plot and relevé data from unpublished reports (Ecologia Environmental 2009, ENV Australia Pty Ltd 2009, Mattiske Consulting 2005, Mattiske Consulting 2007) were an additional source of site information used to determine vegetation community groups.

Interrogation of spatial datasets (nearest neighbour joining, intersections) was used to generate attributes (inundation frequency and period, distance from the Fortescue Marsh Land System outer boundary) for the plots/photopoints and hence their respective vegetation community group.

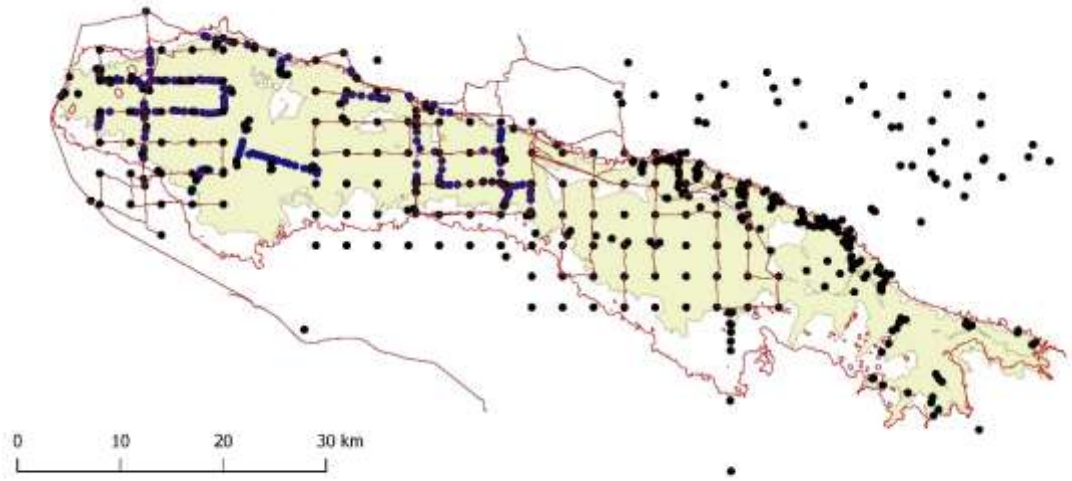



**Figure 3:** Location of vegetation plots, photopoints, camera traps, vehicle tracks and survey sites (plots/relevés) from other unpublished reports, all of which were all used as reference points for mapping vegetation communities on the Fortescue Marsh. (Marsh Land System filled polygon, 410 m ASL contour outlined in red).

# 3. RESULTS

## 3.1 Flora

A total of 352 taxa (species, subspecies and varieties) from 49 families were identified from plots and additional opportunistic collections on/around the Fortescue Marsh. Of these, six taxa could not be resolved to a known species but had affinities to known species (Appendix 1). An additional four taxa were identified as putative hybrids. Nearly 70% of taxa recorded were from seven families, these major families being Poaceae (62 taxa and 1 hybrid), Fabaceae (46 taxa and 4 hybrids), Chenopodiaceae (47 taxa), Malvaceae (32 taxa), Asteraceae (28 taxa), Amaranthaceae (16 taxa) and Goodeniaceae (11 taxa). Dominant genera were *Acacia* (15 taxa and 3 hybrids), *Senna* (9 taxa and 1 hybrid), *Eragrostis* (11 taxa), *Abutilon* (10 taxa), *Ptilotus* (10 taxa), *Maireana* (9 taxa), *Sclerolaena* (9 taxa) and *Tecticornia* (9 taxa).

### *3.1.1 Flora of Conservation Significance*

Fourteen taxa of state priority conservation significance were recorded from this survey (conservation significance entailing near threatened or data deficient species) (Table 1). Western Australian priority listings are according to Jones (2015). Two of these are new records for the survey area, and two species (*Dysphania congestiflora* and *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen 9702) were newly described or phrased-named, and subsequently priority-listed as a consequence of this survey (see Section 3.1.2).

- ***Atriplex flabelliformis* (P3)** (Figure 4): Previously known from the Fortescue Marsh. Most records of this species are from the Fortescue Marsh, with occurrences at nine other general localities scattered from the Midwest and Pilbara to the northern interior near the NT border (CHAH 2015). This is a species of saline habitats, typically salt flats or salt lakes.

- ***Calotis squamigera* (P1)** (Figure 4): Previously known from one collection from the Fortescue Marsh and two localities adjacent to and one within Karijini National Park. These Western Australian populations are greatly disjunct from several localities scattered in the Northern Territory, and the species' main range in central Queensland (CHAH 2015).

- ***Dysphania congestiflora* (P3)** (Figure 4): (see section 3.1.2)

- ***Eragrostis crateriformis* (P3):** New record for the Fortescue Marsh and a c. 200 km range extension south from nearest known location (Western Australian Herbarium 1998-).This species has two main distributions, one centred in central Australia and one centred in the Pilbara Bioregion (CHAH 2015).

- ***Eremophila youngii* subsp. *lepidota* (P4)** (Figure 4): Previously known from the Fortescue Marsh, this species has two disjunct main distributions around the NW Cape and in the south-west Pilbara bioregion, with some populations of the latter's main distribution extending into the adjoining Little Sandy Desert and Gascoyne bioregion regions (Western Australian Herbarium 1998-). Two small outlying distributions are found in central Northern Territory (CHAH 2015).

- ***Eucalyptus rowleyi* (P3)** (Figure 4)**:** First record for the Fortescue Marsh, although known from nearby (30–40 km) south and east of Roy Hill station. Found in scattered localities in the eastern Pilbara and into the Little Sandy Desert Bioregion. This mallee was found in a single, small population of several individuals on red sand dunes on the southern edge of the Fortescue Marsh.

- ***Eleocharis papillosa* (P3)** (Figure 4)**:** The dwarf desert spike rush is primarily located in central Australia, and has been found in four disjunct locations scattered across Western Australia. It is federally listed as Vulnerable (Department of the Environment 2015). Previously known from the Fortescue Marsh.

- ***Eremophila spongiocarpa* (P1)** (Figure 4): Previously known from the Fortescue Marsh. This is a robust shrub which is endemic to the Fortescue Marsh (CHAH 2014), where it can be a dominant species in some samphire communities around the Marsh margins.

- ***Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727) (P3)** (Figure 4)**:** Restricted to the southeastern Pilbara, this is a new record for the Fortescue Marsh. Current molecular analyses are currently being employed to determine if this entity is taxonomically distinct from *Goodenia pascua* (Kelly Shepherd & Steven Dillon, Western Australian Herbarium, pers comm.).

- ***Nicotiana heterantha* (P1)** (Figure 4)**:** Previously known from the Fortescue Marsh. As a herbaceous annual, this species was relatively widespread in the survey area following significant June rainfall. This species occurs at several coastal localities scattered from near Karratha to north of Broome and two inland locations, one of these being the Fortescue Marsh (CHAH 2014). This species was found to be locally abundant and growing well, its vigorous growth being attributed to recent rainfall events in June 2013.

- ***Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen 9702) (P1)** (Figure 4): (see section 3.1.2)

- ***Tecticornia globulifera* (P1)** (Figure 4)**:** Previously known from the Fortescue Marsh. This species was found as locally abundant in some samphire communities. In addition to the Fortescue Marsh, this species is known from one other locality c. 200 km to the southeast (CHAH 2014).

- ***Tecticornia medusa* (P3)** (Figure 4)**:** Previously known from the Fortescue Marsh, which is the Type locality of this species, *Tecticornia medusa* is known from one other location at Weelarrana Lake, c. 165 km south of Roy Hill (Shepherd & van Leeuwen 2011). This species was found in early successional stages of lake bed regrowth following inundation events, in areas near freshwater inflow during flooding.

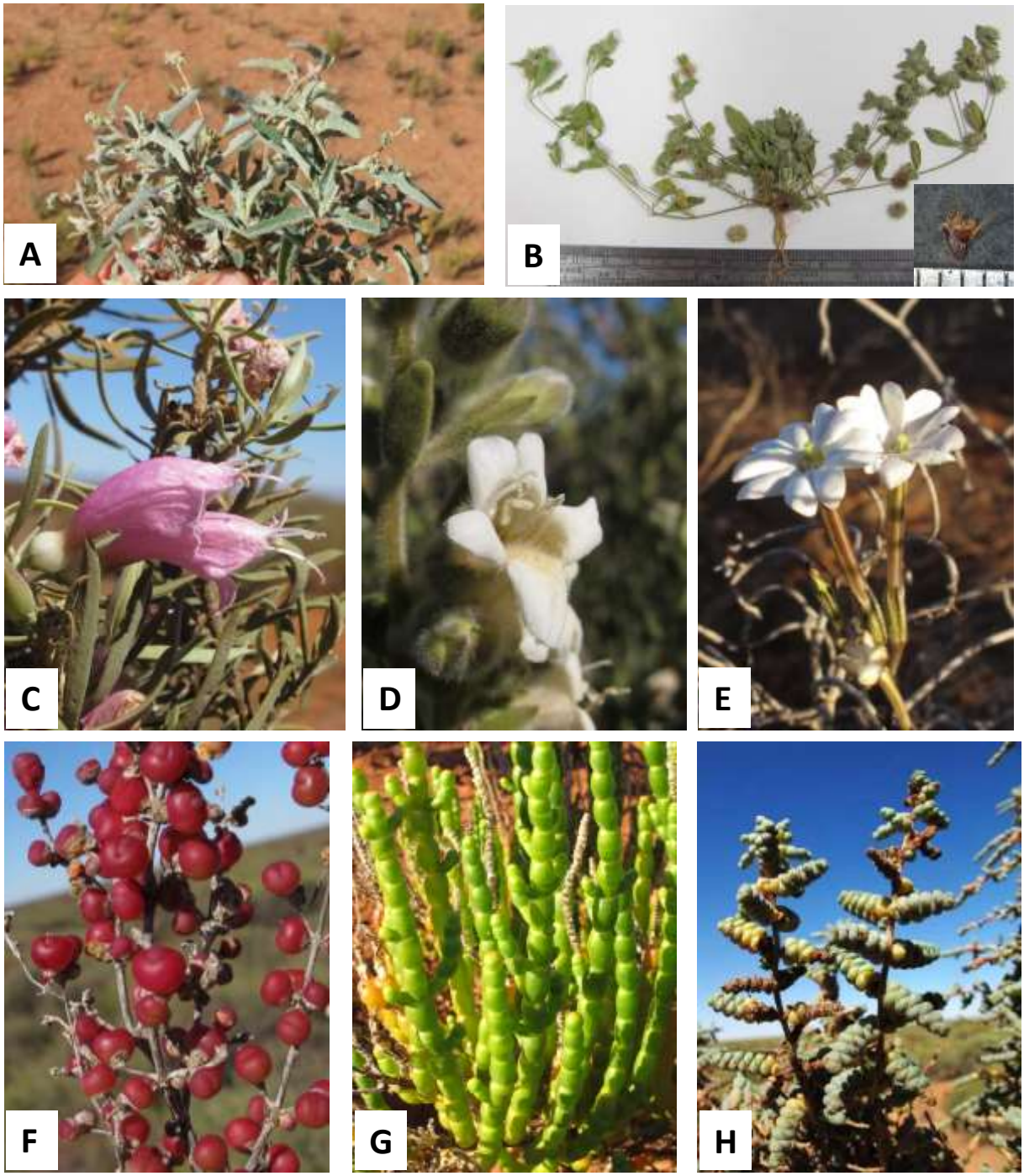



**Figure 4:** Examples of flora of conservation significance located during Fortescue Marsh survey **A:** *Atriplex flabelliformis* **B**: *Calotis squamigera* **C**: *Eremophila youngii* subsp. *lepidota* **D**: *Eremophila spongiocarpa* **E**: *Nicotiana heterantha* **F**: *Tecticornia globulifera* **G:** *Tecticornia medusa* **H:** *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063).

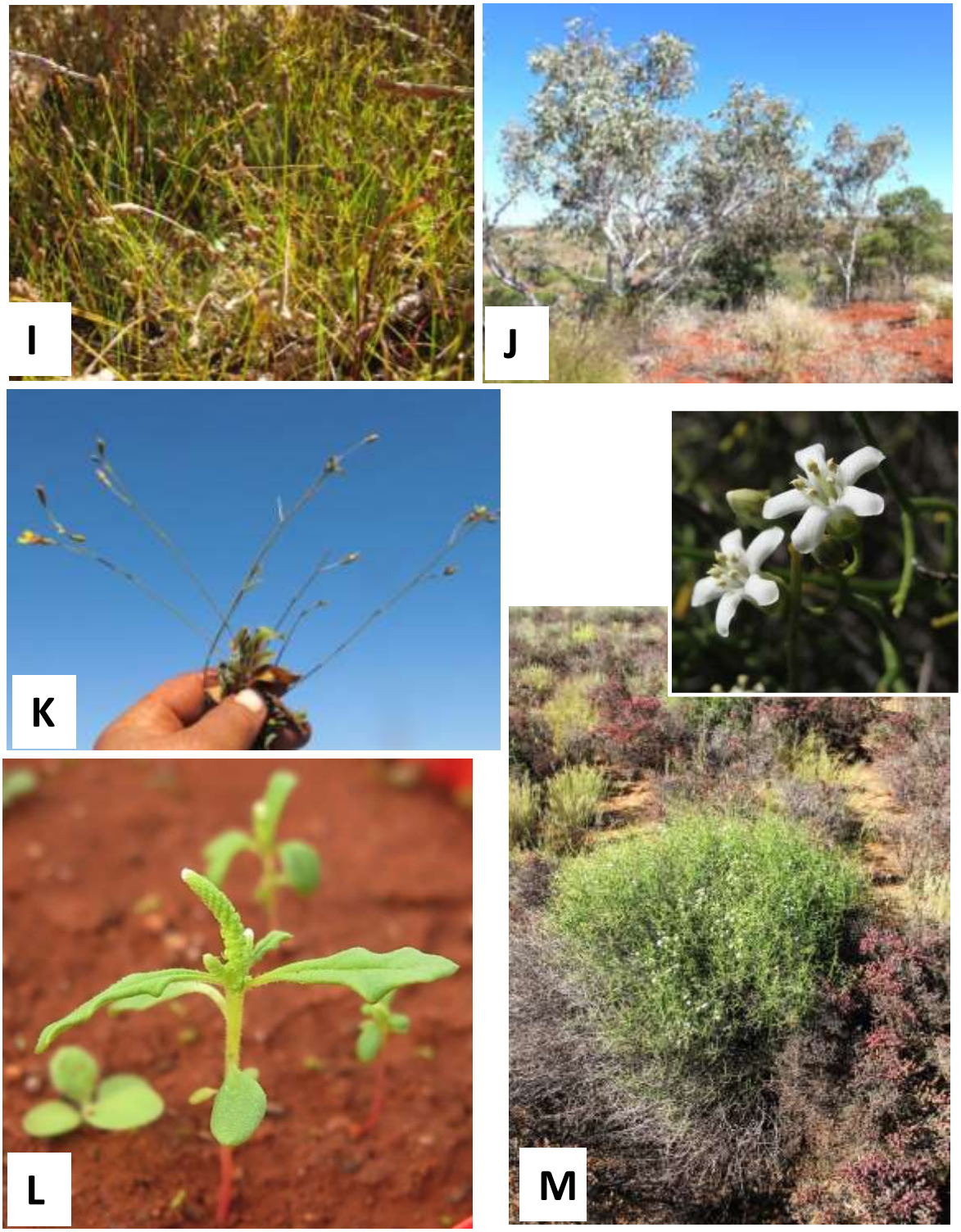



**Figure 4 cont. I:** *Eleocharis papillosa* **J**: *Eucalyptus rowleyi* **K**: *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727) **L**: *Dysphania congestiflora* **M**: *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen 9702) (inset: detail of flowers).

- ***Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (P1):** Previously known from the Fortescue Marsh. This species was found as a locally abundant species in some samphire communities. In addition to the Fortescue Marsh, this species is known from other localities c. 200 km to the southeast (CHAH 2014).

**Table 3: Flora of Conservation Significance located during the Fortescue Marsh Flora and Vegetation Survey.** Priority codes from Department of Parks and Wildlife (Jones 2015). Distribution and endemism determined from herbarium records (CHAH 2015, Western Australian Herbarium 1998-).

| | |
|---|---|
| *Atriplex flabelliformis* **(P3)** | |
| *Calotis squamigera* **(P1)** | |
| *Dysphania congestiflora* **(P3)** | **New species** |
| *Eragrostis crateriformis* **(P3)** | **c. 200 km range extension** |
| *Eremophila youngii* subsp. *lepidota* **(P4)** | |
| *Eremophila spongiocarpa* **(P1)** | **Endemic** |
| *Eucalyptus rowleyi* **(P3)** | **New record for Marsh** |
| *Eleocharis papillosa* (**P3)** | |
| *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727) (**P3)** | |
| *Nicotiana heterantha* **(P1)** | |
| *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen 9702) **(P1)** | **Near endemic** |
| *Tecticornia globulifera* **(P1)** | **Near endemic** |
| *Tecticornia medusa* **(P3)** | **Near endemic** |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) **(P1)** | **Near endemic** |

Two the four near-endemic species had outlying populations at Lake Disappointment (*Tecticornia* sp. Christmas Creek Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063), *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen 9702)).

Six other species of conservation significance previously recorded from or near the Fortescue Marsh but not encountered during the current survey were *Myriocephalus scalpellus, Goodenia nuda, Rhagodia* sp. Hamersley (M. Trudgen 17794), *Lepidium catapycnon*, *Teucrium pilbaranum* and *Stackhousia clementii* (ENV Australia Pty Ltd 2010, Dillon unpublished data, Western Australian Herbarium 1998– ) .

### *3.1.2 New Species from survey*

***Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen 9702)** (Figure 4)**:** Although noted as a novel unnamed entity during the 2004–2006 Pilbara Biological Surveys (M. Lyons and G. Keighery, pers. comm.), this species was phrase-named as part of the Fortescue Marsh vegetation survey project and added to the Census of Western Australian Plants. Allied to *Samolus repens* s. lat. complex, this taxon differs from other species of *Samolus* (including the various forms/varieties and phrase-named entities of *Samolus repens*) by having tall, flexuose, dichotomously and many-branched stems, producing a characteristically erect, tangled, divaricate form. Stems have relatively few, very small, scarious, apparently deciduous cauline scale leaves. Unlike other forms of *Samolus repens* and other species of *Samolus*, both pedicels and branches are distinctly curved upwards in *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) (Figure 3A).

On the Fortescue Marsh, *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) is restricted to both the margins of semi-permanent/permanent freshwater pools and the margins of samphire shrublands where creeks discharge freshwater following periods of high rainfall. This taxon is also found at two locations in the Little Sandy Desert, some 100 km and 150 km SE of the Fortescue Marsh. These particular freshwater-influenced habitats which support *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) appear to be uncommon in the wider landscape, and this species has recently been listed with a Priority 1 conservation listing (Jones 2015).

***Dysphania congestiflora*** was found during the current survey, and formally described in 2015 (Dillon & Markey 2015) (Figure 4). This small annual is similar to the other, co-occuring species with erect inflorescence spikes, *D. plantaginella* and *D. sphaerosperma,* but differs from those two species by its distinctively clustered tepals, elliptic seeds and fruits covered in prominent, gland-like papillae. It was collected from flats on the margin and towards the centre of seasonally inundated flood plains and lake beds on saline, deep, light-medium to heavy clay soils. *Dysphania congestiflora* was recently listed as a Priority 3 species (Jones 2015).

### *3.1.3 Range Extensions and New records for the Fortescue Marsh.*

In addition to the range extensions already noted, a further 18 species have been recorded as new species records for the Fortescue Marsh, with 11 of these also being a significant range extension (> 100 km) from their recorded distribution (Western Australian Herbarium 1998-) (Table 4). Of these new records for non-priority taxa, nine are new records for the Fortescue Marsh, two new records for the Fortescue sub-IBRA, and seven new records for the Pilbara IBRA. Four of these species are associated with gypsum deposits in the centre of the Marsh. Other new species records are disjunctions from the Great Sandy Desert (*Eucalyptus rowleyi*).

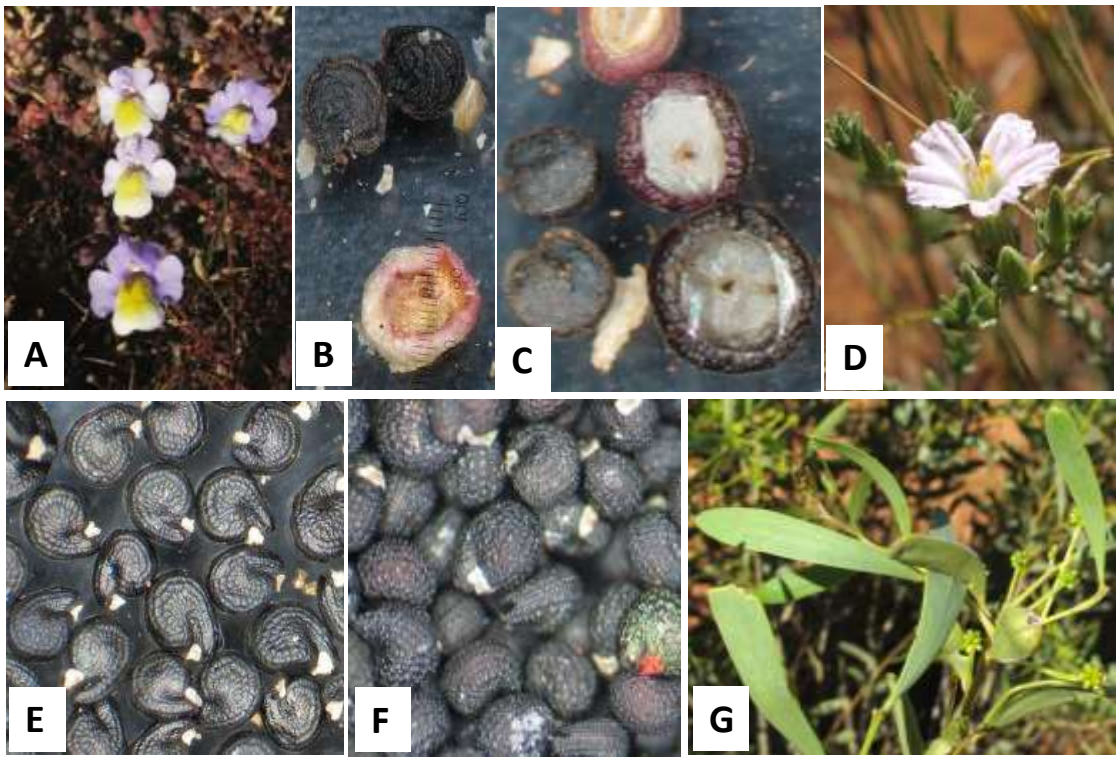



**Figure 5:** Some taxonomically problematic flora taxa identified during survey of Fortescue Marsh **A:** *Mimulus* aff. *gracilis* **B**: *Trianthema* aff. *triquetrum* and **C**: *Trianthema triquetrum* **D**: *Frankenia ambita* **E-F:** *Portulaca oleracea* complex with two different seed forms (smooth and rough): **G**: *Acacia bivenosa* × *sclerosperma* subsp. *sclerosperma*

**Table 4: New records and Range Extensions for Non-priority Flora found on Fortescue Marsh**

NR = new record (Fortescue Marsh, Fortescue subregion or Pilbara region), RE = range extension (distance). IBRA= Interim Biogeographical Regionalisation for Australia**.**

| | |
|---|---|
| *Basilicum polystachyon* | NR (Fortescue Marsh) and RE (>100 km) |
| *Cynodon dactylon* | NR (Fortescue Marsh) of non-native grass. |
| *Echinochloa colona* | NR (Fortescue Marsh) of non-native grass. |
| *Ehretia saligna* var. *saligna* | NR (Fortescue Marsh) and southern RE (>100 km) |
| *Einadia nutans* subsp. *eremaea* | NR (Pilbara IBRA) and northwest RE (>300 km). Nearest known location in the Little Sandy Desert (CHAH 2014). |
| *Eriochloa pseudoacrotricha* | NR (Fortescue sub-IBRA). |
| *Lawrencia helmsii* | NR (Pilbara IBRA), northern RE (>200 km). Located on several isolated gypsum deposits in the centre of the marsh. |
| *Neobassia asterocarpa* | NR (Fortescue sub-IBRA), RE (>100 km). On gypsum deposits |
| *Pittosporum angustifolium* | NR (Fortescue Marsh). Found on aeolian red sand dunes. |
| *Polygonum plebeium* | NR (Pilbara IBRA) |
| *Sauropus trachyspermus* | NR (Fortescue Marsh) |
| *Scaevola collaris* | NR (Fortescue Marsh). RE (>200 km). Gypsum influenced soils. |
| *Sporobolus caroli* | NR (Pilbara IBRA), RE (>400 km) |
| S*wainsona unifoliolata* | NR (Pilbara IBRA), RE (>400 km). Gypsum influenced soils. |
| *Teucrium racemosum* | NR (Fortescue Marsh) |
| *Trianthema turgidifolium* | NR (Fortescue Marsh) |
| *Triglochin hexagona* | NR (Pilbara IBRA), RE (>400 km) |
| *Zygophyllum compressum* | NR (Pilbara IBRA), RE (>100 km) |

### *3.1.4 Unusual and notable taxa*

- ***Acacia ? aptaneura* × *paraneura*:** This is an unusual hybrid which has been tentatively ascribed to the two parental taxa by Bruce Maslin (pers. comm.).

- ***Acacia bivenosa* × *sclerosperma* subsp. *sclerosperma* (hybrid intergrade)**: The two parental taxa are known to readily hybridise (Maslin *et al.* 2010), and this form was closer to *Acacia bivenosa* but leaf morphology (faint second vein and overall leaf shape) indicated its hybrid status when compared to herbarium specimens (B. Maslin, pers. comm.) (Figure 5).

- ***Acacia synchronicial A. robeorum:*** some collections of *Acacia synchronicia* tended to those of forms of *A. robeorum* with narrow leaves. Collections were sterile, so confirmation of species was not possible and it has been treated as *A. synchronicia* in this study.

- ***Eragrostis setifolia* × *xerophila*:** Collections had an intermediate morphology between the two parental taxa which suggested hybrid origins

- ***Frankenia ambita*:** The Fortescue Marsh populations are considerably disjunct from the normal range of this species along the coastline between Exmouth and Broome (based on collections with verified locations and determinations in Australian Herbaria, (CHAH 2014)). The Fortescue Marsh collections both match the description of this species and are within the range of morphological variation (S. Dillon pers. comm.) (Figure 5). However *Frankenia* is a genus requiring further revision, especially in Western Australia, so a future revision of the genus with a comprehensive examination of Western Australian material may determine if there are differences between the disjunct Fortescue Marsh population and the coastal populations of this species.

- ***Goodenia* aff. *tenuiloba*:** This taxon is tentatively allied to but determined to be different to *Goodenia tenuiloba* (S. Dillon, pers. comm.).

- ***Mimulus* aff. *gracilis:*** This entity is unlike species of *Mimulus gracilis* and *Mimulus repens* in its combination of characters, notably its very small leaves, deeply lobed-corolla, erect habit, distinctively sinusoidal peduncles on fruits and the fruits being held upright (Figure 5). It is known from the Fortescue Marsh and a similar entity has been collected from Patience Well in the Great Sandy Desert. There are some affinities to *Mimulus repens* (in the shape of the flower calyx and lobes) as well as some similarities to *Mimulus gracilis*. Collections from the adjacent Fortescue Valley claypans (as part of the Fortescue River Corridor Project) were noted to be dissimilar to the Marsh specimens, tending more to *M. repens* in leaf shape. It is evident that Australian members of this genus require considerable taxonomic work to resolve (Beardsley & Barker 2002).

- ***Paspalidium* aff. *jubiliflorum*:** This taxon is tentatively allied to but determined to be different to *Paspalidium jubiliflorum* (S. Dillon pers. comm.).

- ***Peplidium* sp. E Evol. Fl. Fauna Arid Aust. (A.S. Weston 12768):** Was found to be synonymous with *Peplidium* sp. Fortescue Marsh (S. van Leeuwen 4865), and therefore the latter taxon was removed from the Western Australian Census (Markey 2014).

- There is a species complex of the purslanes, ***Portulaca intraterranea*** and two forms of ***Portulaca oleracea,*** all of which are native species and which indicates that these species need to be addressed as part of a revision into the *Portulaca oleracea* species complex. These three taxa were identified by their seed coat characters (Figure 5). While *Portulaca oleracea* has been listed as introduced (Bean 2007), Hussey *et al.* (1997) considered *P. oleracea* to be a native species in the arid zone. Keighery (2010) found that it has long been considered as having both native and introduced populations in Western Australia, with Australasian forms differing from both the type and other global populations. Widespread in the Pilbara (Florabase 1998-).

- ***Sclerolaena* aff. *densiflora*:** This taxon is tentatively allied to but determined to be different to *Sclerolaena densiflora* by its fruit morphology (3–4 spines and narrower fruit).

- ***Senna* sp. Meekatharra (E. Bailey 1-26):** The *Senna artemisioides* species complex is currently unresolved, and this phrase-named entity has not been formally described. The Pilbara forms, including collections from the Fortescue Marsh, have more ovate leaves than southern forms (Gascoyne, Yalgoo, Ashburton Bioregions).

- ***Tecticornia auriculata*:** This is a mostly coastal species, but has an unusual, disjunct inland distribution centred on the Fortescue Marsh.

- ***Trianthema* aff. *triquetrum*:** Not only was the more typical form of *Trianthema triquetrum* collected (which possesses the distinctive membrane on the fruits which matches the type description), but a distinctively different taxon was also collected (Figure 5). Examinations of collections held at the Western Australian Herbarium revealed that this entity has been previously collected from the Pilbara, and is distinguished by the lack of membranous fruits and seeds having distinct semi-circular ridges (per obs, S. Dillon, pers. comm).

- ***Tribulus* aff. *eichlerianus*:** Collections from the Fortescue Marsh fitted the description of *Tribulus* sp. long styled *eichlerianus* (A.S. George 10666) as described by Barker (2013), with the exception that the styles on Fortescue Marsh specimens were short. Specimens in the Western Australian Herbarium matching this entity have been identified as *Tribulus terrestris*, but these Pilbara collections differ from the introduced *Tribulus terrestris* by their more hairy and irregularly-spiked fruits. The Pilbara entity, including those collected on the Fortescue Marsh, could be an undescribed native taxon. More material needs to be collected of these taxonomically difficult inland, native caltrops to verify their status.

### *3.1.5 Non-native species/invasive weeds*

Twelve non-native weed species were recorded (Appendix 2). At least six of these species (*Aerva javanica, Malvastrum americanum, Cenchrus ciliaris, Parkinsonia aculeata, Solanum nigrum* and *Vachellia farnesiana*) are considered to be significantly invasive (Department of Parks and Wildlife 2014, Hussey *et al.* 1997, Keighery 2010, Longbottom 2004, van Vreeswyk 2004) and have the potential to occupy suitable habitats found on the Fortescue Marsh. Mesquite (*Prosopis* spp.) was not found during the Fortescue Marsh survey, but is a Weed of National Significance which occurs in the wider Pilbara and Carnarvon regions (Department of Parks and Wildlife 2014b, Keighery 2010, Longbottom 2004, van Vreeswyk 2004, Western Australian Herbarium 1998-).

- Buffel Grass (*Cenchrus ciliaris*) is now widespread in the northern half of the state following widespread sowing for pastoralism (Department of Parks and Wildlife 2014b, Hussey *et al.* 1997, Keighery 2010, Moore *et al.* 2006, van Vreeswyk 2004). *Cenchrus ciliaris* was the most widespread and commonly encountered weed on Fortescue Marsh, found on more or less all landforms except the saline samphire communities in the interior of the Marsh, and was most evident on the Marsh edge communities, in alluvial communities, on gypsum ridges and sand

dunes. Dense stands of Buffel Grass appear to be displacing native vegetation in these habitats.

- Kapok Bush (*Aerva javanica*) is a woody shrub initially planted for revegetation which has become widespread in Northern Australia (Hussey *et al.* 1997; van Vreeswyk 2004). As a prolific seed producer with preference for coastal (therefore saline), calcareous and sandy habitats (Keighery 2010), *Aerva javanica* has high potential to increase around the Fortescue Marsh.

- The Australian taxon, *Flaveria australasica* was determined by Bean (2009) to be morphologically indistinguishable to and therefore conspecific with the cosmopolitan species, *Flaveria trinervia*. In doing so, Bean (2009) argues that *Flaveria trinervia* is a pre-European introduction to Australia, where it is widespread (CHAH 2015). However, Keighery (2010) treats *Flaveria trinerva/australasica* as native. On the Fortescue Marsh, it is associated with Marsh vegetation communities - notably on marginal samphire and grassy-samphires where freshwater has seeped onto the Marsh from adjacent rocky landforms.

- Mimosa bush (*Vachellia farnesiana*) is another cosmopolitan species considered to be alien in Australia and established prior to European colonisation (Bean 2007, Keighery 2010, Hussey *et al.* 1997). *Vachellia farnesiana* is located around the Marsh as a distinctive component in riparian, alluvial floodplain and Calcrete/Marsh edge communities.

- Spiked Malvastrum (*Malvastrum americanum*) is widespread in northern and central Australia, and a major landscape-scale weed in the Pilbara region (Keighery 2010). It was located in a range of communities around the Marsh margins, including alluvial drainage lines, marginal shrublands, and marginal, species-rich samphires. Its absence or reduced cover observed in 2014 relative to 2013 was attributed to drier site conditions that following year.

- *Setaria verticillata* (Whorled Pigeon Grass) is found across Australia including the Pilbara region (Keighery 2010, Department of Parks and Wildlife 2014). It was found at relatively low densities at a nine sites in shrubland communities on the Marsh margins. It has the potential to become a major weed on alluvial plains and riparian vegetation on the Fortescue Marsh.

- *Echinochloa colona* is a widespread species in Australia and considered a pre-European introduction (Bean 2007, Keighery 2010). It was located in low densities in five marginal samphire locations on the Fortescue Marsh.

- *Solanum nigrum* was located as poorly-growing individual plants at one site on an alluvial plain. This species is widespread in Australia, particularly in southern regions but also

extending into northern Australia. On the Fortescue Marsh, it was only located on the banks of Moorimoordinia Pool. It has the potential to occupy damp, rich soils along freshwater pools.

- *Parkinsonia aculeata* is a Weed of National Significance which was located by this survey at numerous locations along the upper Fortescue River and tributaries 2 km north of the Roy Hill homestead, and along the banks of 14 Mile Pool. It has been recorded from this area in previous surveys (Longbottom 2004). A mapping and eradication program is currently in progress as part of the National Landcare Program and Pilbara Mesquite Management Committee. On the Fortescue Marsh this species appears to be associated with ephemeral creeklines and alluvial areas, which is typical of this species (Keighery 2010), and does not appear to be invading the saline flood plains and lake beds of the Marsh (Hamish Robertson, pers. comm.).

## 3.2 Floristic Communities and Analysis

### *3.2.1 Classification*

Owing to seasonal differences between years, the final floristic community analyses were run on data collected in 2014. Eleven plots established in 2013 could not be rescored the following year owing to high water levels in the Marsh. Therefore, analyses were conducted on species cover-abundances for 298 taxa in 117 plots. Species or species pairs which were difficult to resolve or distinguish were amalgamated to one taxon for analysis (*Eragrostis pergracilis* and *Eragrostis falcata* were amalgamated with *Eragrostis dielsii*; *Trianthema triquetrum* and *Trianthema* aff. *triquetrum*, *Sclerolaena densiflora* and *Sclerolaena* aff. *densiflora*, *Euphorbia boophthona* and *Euphorbia tannensis*, *Marsilea drummondii*, *M. exarata* and *M. hirsuta*). The final dataset consisted of 196 perennial taxa after the omission of seasonably variable annual and geophytic taxa. For the 2014 season, total species richness ranged from 3 to 65 taxa/plot (average: 22 $\pm$ 15.1 taxa/plot for n=128 plots), and 14.7 $\pm$ 10.7 perennial taxa/plot (ranging from 2 to 43 perennial taxa/plot for n=128 plots).

Plots were classified into 12 major groups, eight of which were further subdivided into subgroups, ultimately amounting to a total of 21 community units (Figure 6). Groups were resolved at variable similarity levels and their selection was based on dendrogram structure, branch support from statistical analysis, and/or from field observations and from the two way sorted data table (Appendix 3). Community total species richness, distance from Marsh boundary and average inundation duration are summarised in Figures 7A–D.

At the highest level, the first major division in the dendrogram separated plots into three broad categories (Figure 6). The first group (AA-BB) includes species-poor samphire communities (Figure 6) predominantly distributed into the far interior of the Fortescue Marsh where these communities border central lake beds and saline plains (Figure 7A). The average duration of flooding (1988–2012) ranges from 14–173 days/yr (average 89 $\pm$ 51 days/yr), and Groups AA and AB in particular experience among the highest inundation periods observed for the community groups (Figure 7C, 7D).

The second group (CA-FB) encompasses samphire and shrub-samphire communities distributed from the margins to the interior of the Fortescue Marsh (Figure 6, Figure 7A). The species richness per plot ranges widely from 8–64 taxa/plot (20.7 $\pm$ 13.8 taxa/plot, n=74) (Figure 7B), and the frequency of inundation is similarly variable, ranging from 0–144 days/yr (36 $\pm$ 41.6 days/yr, n=73) (Figure 7C). The third group (G-L) consists of woodland, shrubland or grassland communities usually on the periphery or outside the Fortescue Marsh Land System (Figure 6, Figure 7A). These community groups occur close to the Marsh perimeter or outside the Marsh boundary, on a range of substrates including calcrete, red sands, gypsum, clays, colluvium or alluvium (see Section 3.2.2). The exception is Community Group L, which is located on gypsum outcrops in the interior of the Marsh (Figure 7A). While samphires (*Tecticornia* spp.) are not a major component of these communities, bluebushes (*Maireana, Sclerolaena*) and saltbushes (*Atriplex*) represent the chenopods (Appendix 3).

When flood duration (hydroperiod) is taken from a larger dataset of plots and photopoints for the same Vegetation Community Groups mapped across the Fortescue Marsh, a similar trend is observed (Figure 7D). Vegetation Community Groups are associated with hydroperiod zones, where Groups AA, AB, BA, BB, E and F coincide with areas of greater average inundation duration. Groups C, DA, DB and the marginal or non-Marsh Groups experience shorter durations of inundation except for Group G, which is a riparian community associated with semi-permanent / permanent freshwater pools.

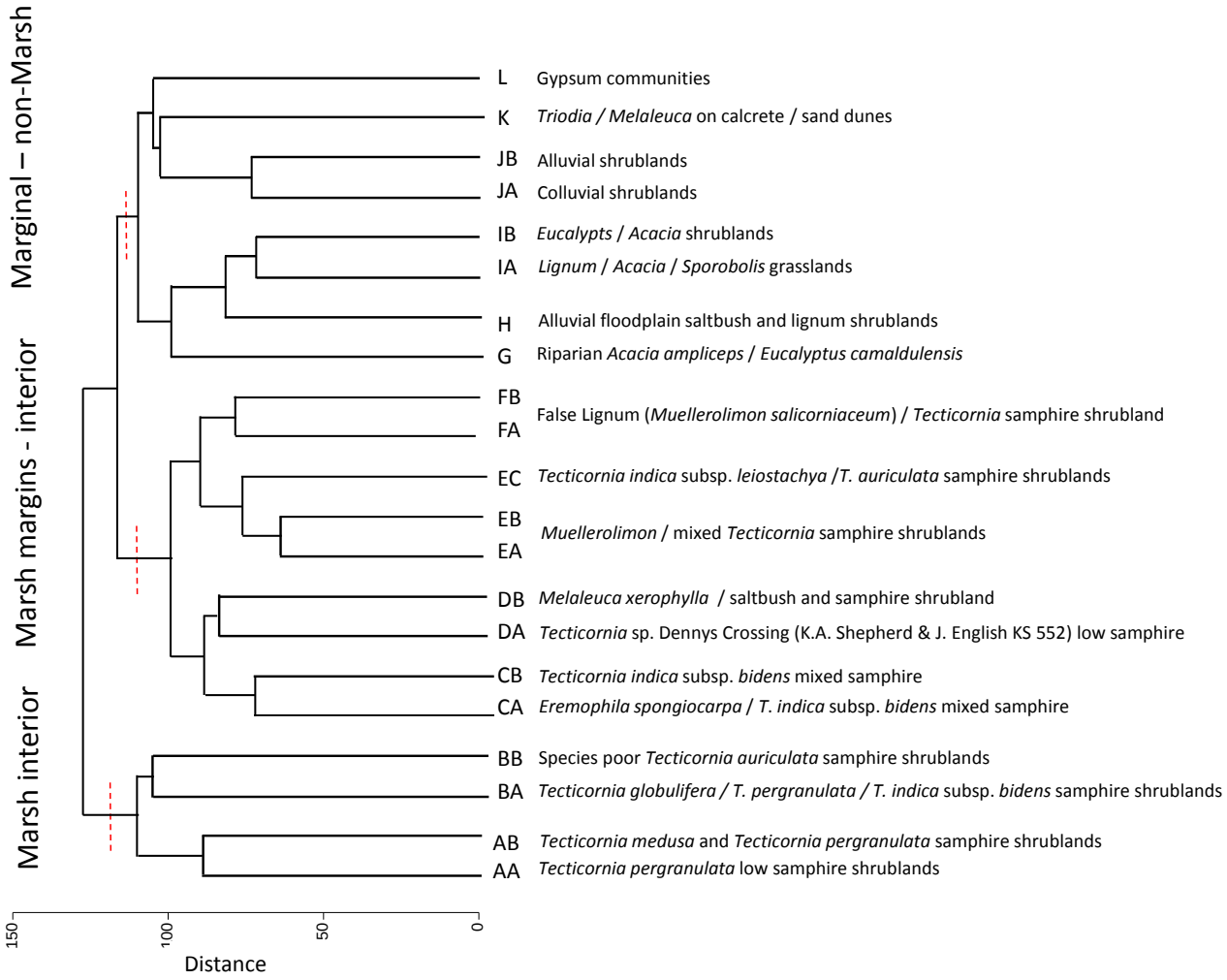



**Figure 6:** Site classification of 117 plots using mid-point of cover-abundance scale data for 196 perennial taxa collated in 2014 field season (UPGMA, flexible $\beta$=-0.1). Red dashed line indicates three major groupings, and ultimate units are the 21 Vegetation Communities resolved for the Fortescue Marsh.

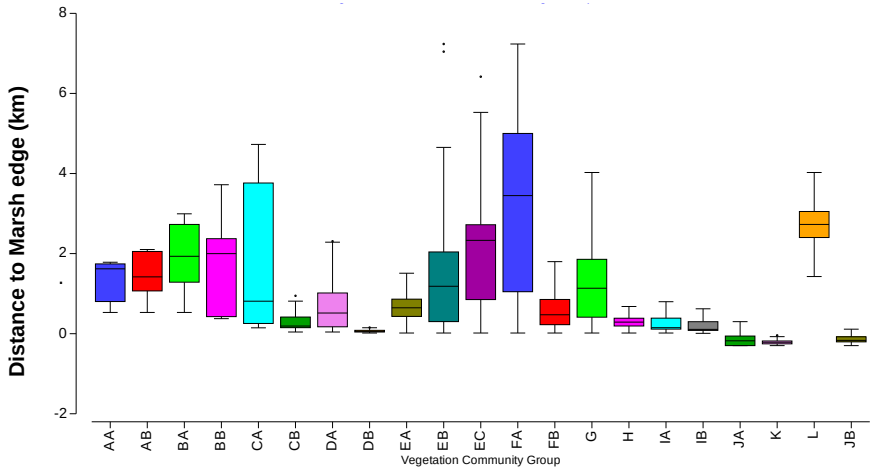



**Figure 7A**: Box plots of distance (km) from plot to edge of the Marsh Land System outer boundary for Vegetation Communities identified on the Fortescue Marsh, using data from 117 plots. The outlying Community Group L is the gypsum outcrop community.

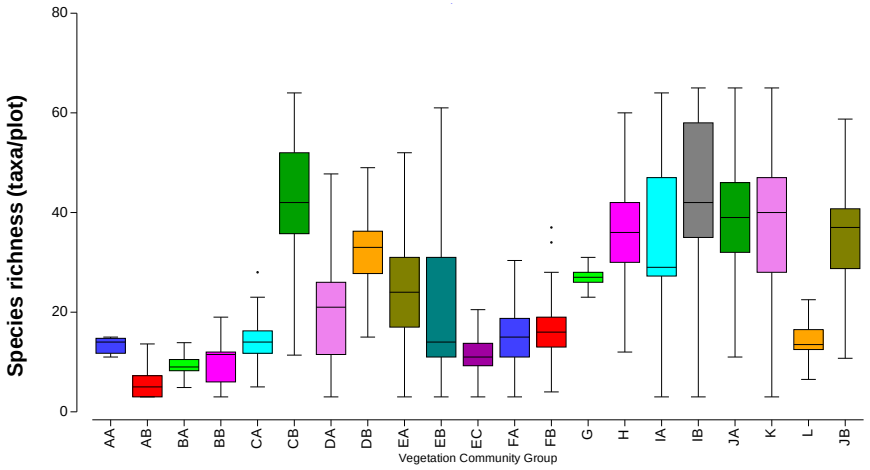



**Figure 7B**: A: Box plots of total species richness (annuals and perennials) for 117 plots using 2014 data. Note that species counts for Community Group G is based on the smaller, linear plots (500 $m^2$) relative to other 2500 $m^2$ plots for the remaining groups.

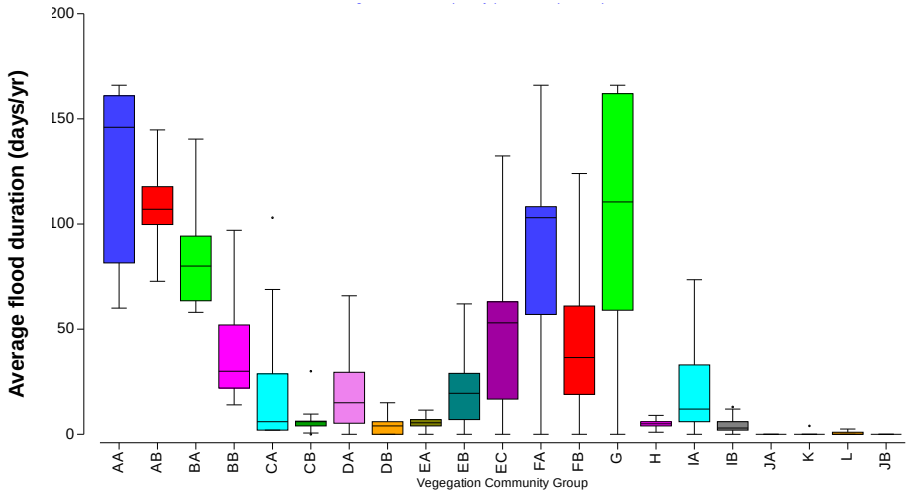



**Figure 7C**: Box plots of Average Flood Duration (days/yr) (for period 1988–2012) for Vegetation Communities identified on the Fortescue Marsh, using data from 117 plots. Inundation for most community groups is due to flood events, with the exception of Community Group G, which a riparian community on semi-permanent/permanent freshwater pools

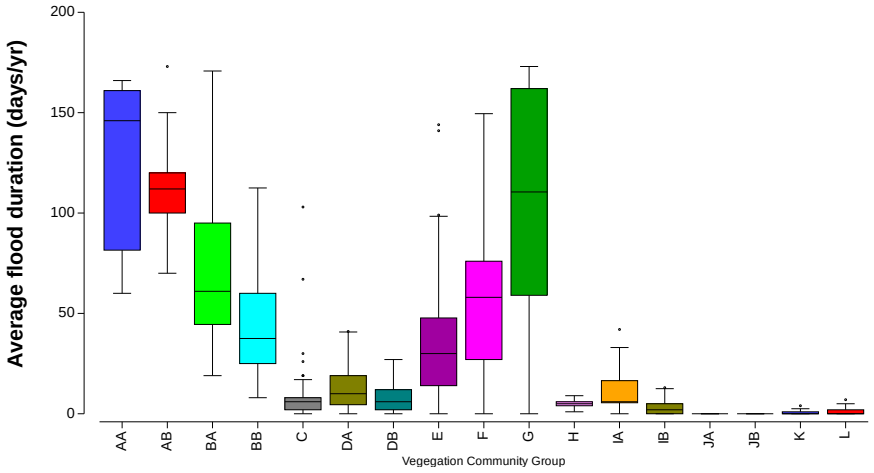



**Figure 7D**: Box plots of average flood duration for period 1988–2012 (days/yr) for Vegetation Communities identified on the Fortescue Marsh, using data from 347 photopoints (including 125 plots) identified from vegetation map.

### *3.2.2 Site Ordination and Environmental Attributes*

The 2D nMDS ordination (Figure 8) corresponded with the Site Classification (i.e. sites classified as a vegetation community group were found to cluster in the ordination). Superimposing average flood period on this ordination, this suggests a strong environmental gradient primarily associated with inundation frequency is influencing floristic composition across sites, mostly separating floristic associations from the deepest Marsh interior (Groups A and B) to those on the Marsh edge and adjacent non-Marsh landforms (Groups H - L) (Figure 9). A similar trend is observed using the variable of distance from marsh edge (not shown), but this isn't as as marked as inundation period as some sites may be frequently inundated or are permanent freshwater pool edges, but are still located close to Marsh edge.

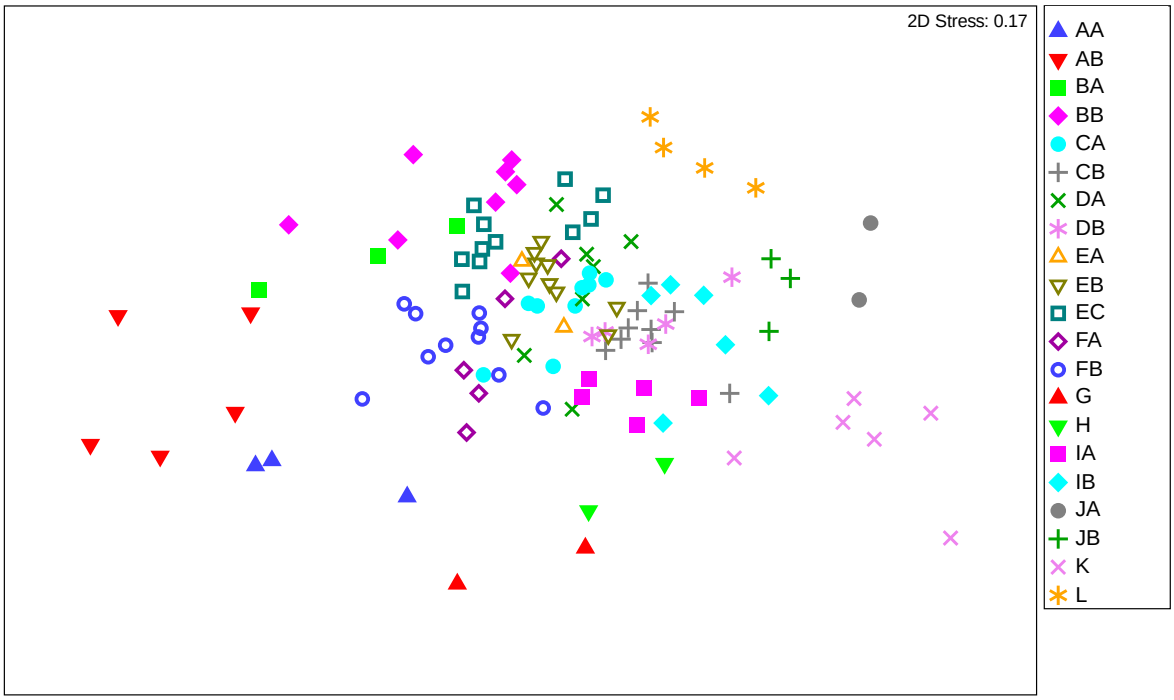



**Figure 8:** Two dimensional nonmetric multidimensional scaling (2D nmMDS) ordination of 117 plots using mid-point of cover-abundance scale data for 196 perennial taxa collated in 2014 field season. Plots overlain with 21 Vegetation Communities resolved for the Fortescue Marsh.

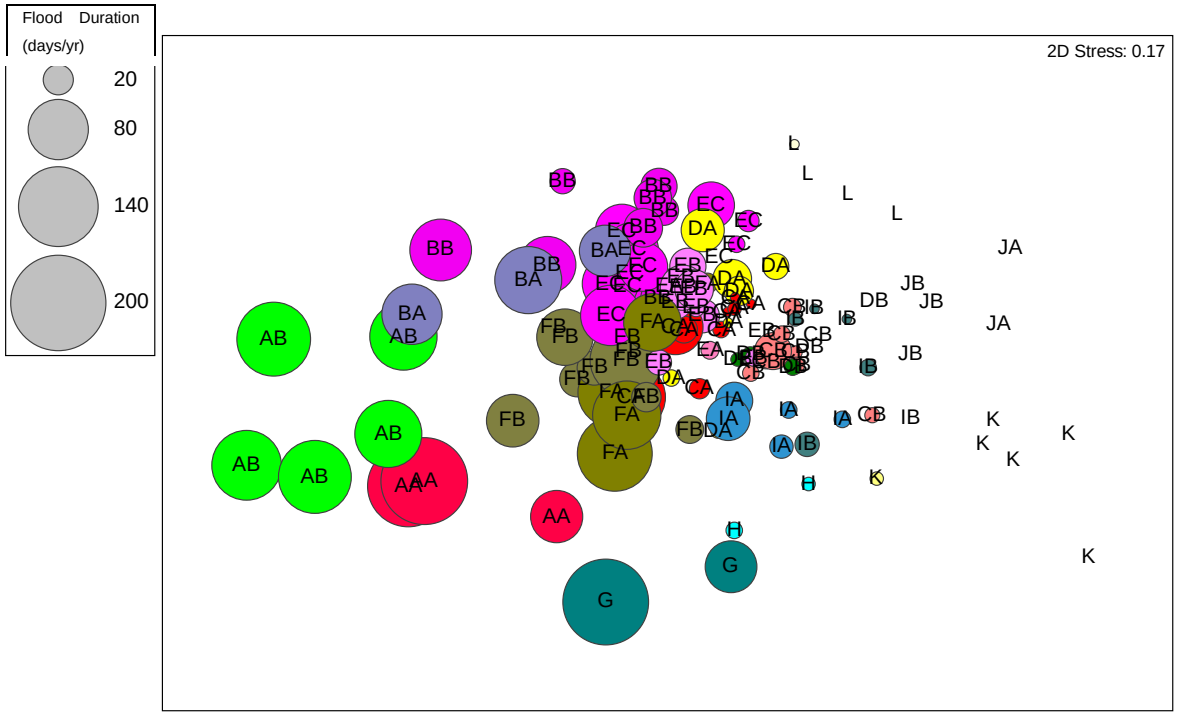



**Figure 9:** Bubble chart of Average Flood Duration (days/yr) (for period 1988–2012) superimposed on the nMDS ordination of Fortescue Marsh floristic data from 117 plots (See Figure 8). Inundation for most sites is due to flood events, with the exception of two sites (Group G), which are located on permanent freshwater pools

All variables used in the analysis were continuous, checked for heteroscedasticity and intercorrelation and transformed accordingly before analysis. A single variable was retained for sets of highly intercorrelated ($p > 0.9$) soil variables ((salt, Na and EC), (S and gypsum)). For each vegetation community type, summary environmental attribute data are given in Table 5. Altitude, distance from Marsh edge and species richness have already been addressed for major floristic groupings (Figures 7A-D).

Using 26 environmental variables (sand, silt, As, B, Ca, Cd, Cu, Fe, pH, clay, Co, K, Mg, Mn, Mo, N, Na, Ni, P, Pb, Se, Zn, average flood duration, altitude, gypsum content, distance from marsh edge), the BEST procedure found a combination of five variables (Cd, Cu, Fe, Mg and Na) with highest rank correlation with the species resemblance matrix (Spearman's Rho statistic = 0.471, p= 0.0076). When variables with frequently negligible concentrations across sites are omitted from BEST procedure, the combination of five variables identified as significantly correlated with the species resemblance matrix were pH, Fe, K, Mg and Na (Spearman's Rho statistic = 0.450, p = 0.0401).

Bubble charts (Figure 10) for all environmental parameters superimposed on the site floristic ordination (including those identified by the BEST procedure) show the following trends:

**Soil clay** content is low in sites classified as Group AB relative to most other sites, particularly in comparison to the high values observed in sites classified as community Group AA (Figure 10A). This

is attributed to Community Group AB occurring in lakes with limited inflow while Community Group AA sites occur on the alluvial flood plains around the channels. Moderately high values for soil clay content occurs not only in saline lake bed communities (Groups B-E), but also and riparian (H-I) groups. Low values of soil clay content found in marginal communities (JA, K and L) reflects the lack of inundation and deposition of sediments,and presence of exposed bedrock or sand deposits at these sites.

**Soil calcium** is found to be high in the calcrete sites for Group K, gypsum hillocks (Group L), which can be attributed to the calcareous substrate (Figure 10B). Soil Ca was correspondingly low in alluvial/riparian sites/groups (H, I, JB) and low for the sand dunes sites of Group K. **Soil magnesium** is highest among the interior communities (A-F) and lowest in marginal, alluvial and gypsum groups (G-L) ((Figure 10C). A similar trend was observed for soil **copper, potassium** and **iron**, with notably lower soil concentrations in soils from marginal/non-Marsh or gypsum outcrop communities (J, K, L) in comparison to the other groups ((Figure 10D-F). **Soil Cu, Ca, Mg and K** is very low to near-absent in the sand dune sites of Group K. **Soil cadmium** has markedly low concentrations in Groups AB, JA, K, and sites variously classied as Groups B and D (Figure 10G).

Soil Ca and Mg tends to be relatvely higher in Group AB (interior lake bed community) than for Group AA (occurring in the flood plain around the channels), which suggests mineral deposition is relatively higher in these poorly-flushed lake bed sites where Group AB is located (Figure 10B-C). Conversely, there are higher concentrations of Cd in Group AA relative to Group AB, which mirrors trends in soil clay content (Figure 10G).

**Soil sodium** (which corresponds to soil salinity), was relatively high in the interior Groups AB, BB and EC and correspondingly low in alluvial, riparian, marginal and off-Marsh groups (G-K) and for sites at the crests of gypsum outcrops for Group L ((Figure 10H)). Of note among the interior communities, salinity in Group AB is higher than in AA, which may be attributed to the freshwater inputs which flush through this community. Salinity is also relatively higher in Group DA sites in comparison to to the Marsh-edge, infrequently inundated Marsh-edge community, Group DB.

Soil **gypsum** content was not unsurprisingly highest in the gypsum outcrop community, Group L, and moderately-high in saline flood plain groups (B, E, F, C) where gypsum crystals were observed in these soils. While relatively low, there was higher gypsum content in Group AB than AA, which again may be attributed to these being depositional sites on the saline flood plain (Figure 10I).

Soil **pH** was found to be a stastically significant factor in second BEST analysis, with neutral soils (generally pH 7-8) found among most groups but tending to lower values (pH 6) among sites Community Groups BA, JA, K and H (Figure 10J, Table 5).

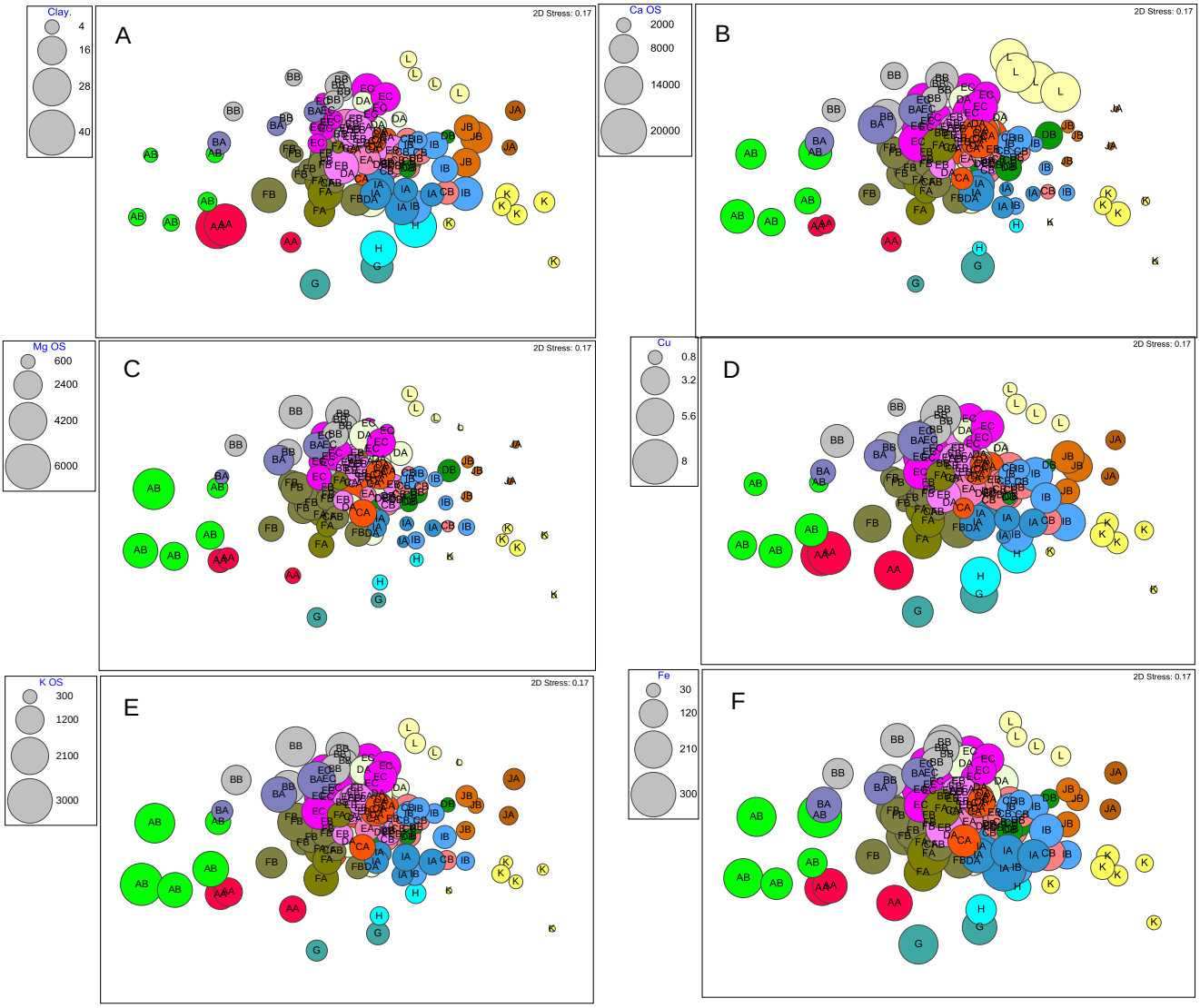



**Figure 10**: Bubble Charts of soil variables superimposed on nMDS ordination of floristic mid-ppoint cover values for 117 sites on the Fortescue Marsh. A:Clay (%), B: Calcium (mg/kg), C: Magnesium (mg/kg), D: Copper (mg/kg), E: Potassium (mg/kg), F: Iron (mg/kg).

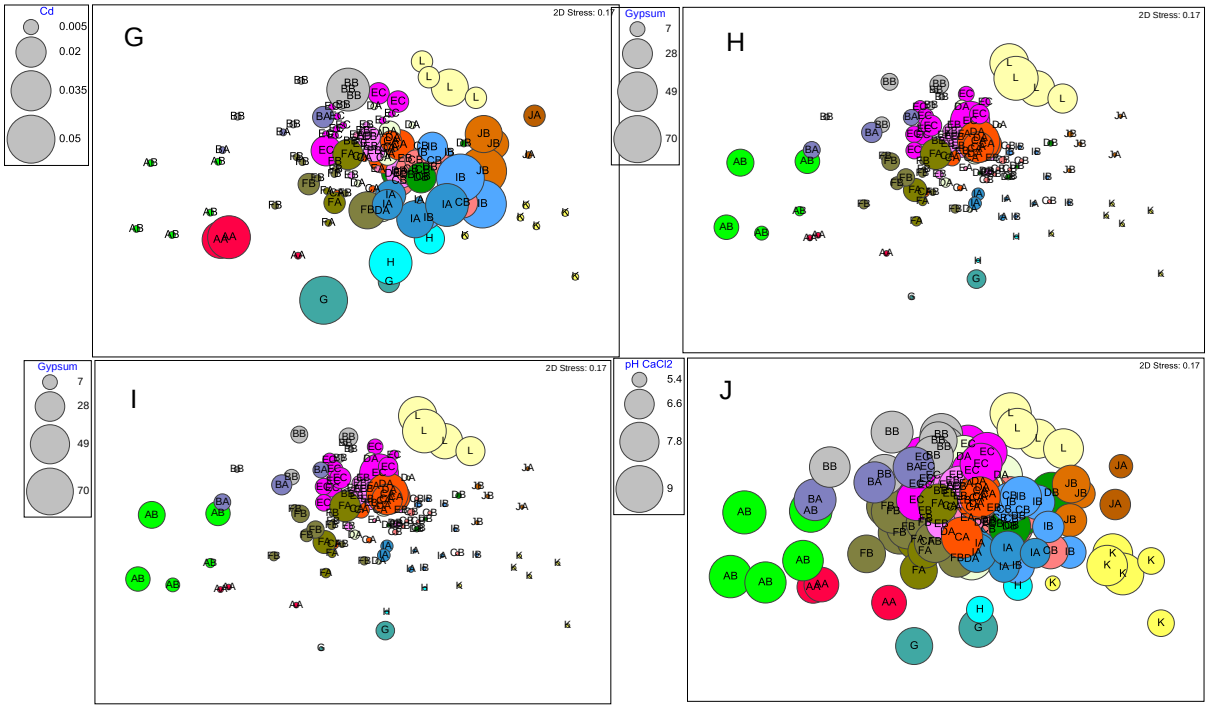



**Figure 10 cont.**: Bubble Charts of soil variables superimposed on nMDS ordination of floristic mid-ppoint cover values for 117 sites on the Fortescue Marsh. G: Cadium (mg/kg), H:Sodium (mg/kg), I: Gypsum (%), J: pH ($CaCl_2$)

**Table 5: Summary Environmental attribute data for vegetation communities of the Fortescue Marsh.**

| | Vegetation Community Groups | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **AA** | **AB** | **BA** | **BB** | **CA** | **CB** | **DA** | **DB** | **EA** | **EB** | **EC** |
| **EC (1:5)** | 630 ± 244.2 | 1976 ± 528.94 | 742.79 ± 297.11 | 1056.25 ± 365.77 | 835.56 ± 155.1 | 103.89 ± 31.68 | 676.86 ± 233.49 | 79.2 ± 15.74 | 66.5 ± 53.5 | 1022.6 ± 233.95 | 1019.09 ± 218.44 |
| **pH (CaCl2)** | 7.1 ± 0.1 | 8.22 ± 0.07 | 5.89 ± 1.58 | 8.04 ± 0.08 | 8.1 ± 0.04 | 8.01 ± 0.12 | 8.31 ± 0.05 | 8.28 ± 0.05 | 7.15 ± 0.05 | 7.98 ± 0.16 | 8.07 ± 0.05 |
| **Sand (%).** | 37.0 ± 7.9 | 70.5 ± 3.2 | 40.3 ± 15.6 | 66.2 ± 5.1 | 71.9 ± 3.7 | 65.9 ± 4.1 | 76.79 ± 5.8 | 81.5 ± 3.3 | 46.0 ± 13.5 | 62 ± 4.9 | 64.0 ± 2.9 |
| **Silt. (%)** | 37 ± 1.8 | 23.8 ± 3.16 | 17.83 ± 7.75 | 27.25 ± 4.56 | 20.83 ± 2.63 | 24.33 ± 3.68 | 15.93 ± 3.79 | 13.3 ± 2.78 | 31.25 ± 6.25 | 26.3 ± 3.38 | 28 ± 2.16 |
| **Clay. (%)** | 26 ± 9 | 5.7 ± 0.49 | 6.2 ± 1.65 | 6.56 ± 1.12 | 7.22 ± 1.62 | 9.78 ± 0.64 | 7.29 ± 2.51 | 5.2 ± 0.7 | 22.75 ± 7.25 | 11.7 ± 2.14 | 8 ± 1.61 |
| **N total (%)** | 0.08 ± 0.01 | 0.06 ± 0.01 | 1.03 ± 0.99 | 0.06 ± 0 | 0.05 ± 0.01 | 0.05 ± 0.01 | 0.05 ± 0.01 | 0.05 ± 0.01 | 0.04 ± 0 | 0.05 ± 0.01 | 0.06 ± 0.01 |
| **B (mg.kg)** | 2.73 ± 0.35 | 21.6 ± 2.04 | 9.57 ± 3.73 | 15.03 ± 5.16 | 9.56 ± 2.5 | 3 ± 1.12 | 13.11 ± 3.5 | 3.44 ± 0.65 | 0.9 ± 0.2 | 7.16 ± 1.56 | 10.61 ± 1.83 |
| **Ca (mg.kg)** | 3551.3 ± 134.0 | 8832.67 ± 851.05 | 6568.8 ± 2676.34 | 6804.63 ± 1184.09 | 9511.5 ± 1402.97 | 3502.36 ± 594.03 | 8184.08 ± 1403.82 | 5290.87 ± 903.71 | 2311.16 ± 249.93 | 7292.39 ± 879.7 | 10550.43 ± 682.77 |
| **Cd (mg.kg)** | 0.02 ± 0.01 | 0 ± 0 | 1 ± 1 | 0.01 ± 0 | 0.01 ± 0 | 0.01 ± 0 | 0 ± 0 | 0.01 ± 0 | 0 ± 0 | 0 ± 0 | 0 ± 0 |
| **Co (mg.kg)** | 2.77 ± 0.12 | 0.95 ± 0.19 | 1.63 ± 0.86 | 1.01 ± 0.29 | 1.21 ± 0.3 | 2.43 ± 0.47 | 0.66 ± 0.13 | 0.5 ± 0.06 | 4.45 ± 1.55 | 1.02 ± 0.22 | 0.84 ± 0.13 |
| **Cu (mg.kg)** | 6.67 ± 0.41 | 3.1 ± 0.59 | 3.64 ± 0.98 | 3.16 ± 0.67 | 2.42 ± 0.35 | 2.96 ± 0.61 | 1.3 ± 0.21 | 0.76 ± 0.07 | 4.85 ± 0.05 | 2.85 ± 0.49 | 3.15 ± 0.33 |
| **Fe (mg.kg)** | 183.33 ± 3.33 | 206 ± 29.26 | 108.85 ± 38.04 | 168.75 ± 6.93 | 143.78 ± 18.37 | 133.89 ± 12.15 | 161.43 ± 14.71 | 116.8 ± 18.98 | 115 ± 5 | 156.4 ± 12.28 | 164.73 ± 12.2 |
| **K (mg.kg)** | 1214.2 ± 95.0 | 1960.18 ± 293.87 | 1001.18 ± 429.4 | 1427.34 ± 190.07 | 1131.21 ± 140.82 | 716.83 ± 59.7 | 884.13 ± 165.75 | 431.74 ± 87.45 | 877.59 ± 55.97 | 1198.26 ± 189.42 | 1394.07 ± 148.27 |
| **Mg (mg.kg)** | 1261.7 ± 270.3 | 2895.86 ± 643.1 | 1188.15 ± 494.31 | 2097.35 ± 336.17 | 1490.41 ± 288.53 | 673.13 ± 83.18 | 1876.05 ± 237.29 | 1203.56 ± 98.01 | 647.85 ± 118.4 | 1551.5 ± 249.93 | 1550.95 ± 272.62 |
| **Mn(mg.kg)** | 190 ± 26.46 | 85.8 ± 16.93 | 58.19 ± 20.23 | 84.5 ± 10.97 | 95.56 ± 13.91 | 140.11 ± 22.27 | 76.57 ± 11.63 | 44.8 ± 2.62 | 238.74 ± 38.74 | 90.5 ± 13.52 | 90.18 ± 7.69 |
| **Na (mg.kg)** | 5364.4 ± 2490.3 | 17336.41 ± 5262.81 | 5716.81 ± 2600.61 | 8999.83 ± 3667.29 | 6372.59 ± 1528.16 | 678.34 ± 204.61 | 5600.08 ± 2639.97 | 432.65 ± 210.84 | 516.05 ± 331.15 | 7894.87 ± 2105.35 | 7757.09 ± 2189.55 |
| **Ni (mg.kg)** | 2.13 ± 0.22 | 1.04 ± 0.14 | 1.49 ± 0.89 | 0.88 ± 0.22 | 0.7 ± 0.11 | 1.27 ± 0.21 | 0.59 ± 0.08 | 0.38 ± 0.04 | 2.1 ± 1 | 0.75 ± 0.14 | 0.65 ± 0.04 |
| **P (mg.kg)** | 23.7 ± 4.5 | 28.2 ± 8.49 | 30.7 ± 13.08 | 58.88 ± 9.16 | 30.22 ± 3.67 | 30.11 ± 6.38 | 31.57 ± 3.77 | 23 ± 4.76 | 17 ± 3 | 35.9 ± 6.46 | 38.82 ± 3.26 |
| **Zn (mg.kg)** | 4.7 ± 2.0 | 1.24 ± 0.41 | 1.64 ± 0.85 | 0.74 ± 0.23 | 1.12 ± 0.17 | 2.22 ± 0.35 | 0.74 ± 0.15 | 0.72 ± 0.07 | 2.15 ± 0.05 | 1.33 ± 0.29 | 1.04 ± 0.17 |
| **As (mg.kg)** | 0.13 ± 0.03 | 0.26 ± 0.04 | 1.21 ± 0.95 | 0.23 ± 0.03 | 0.27 ± 0.04 | 0.09 ± 0.02 | 0.19 ± 0.03 | 0.12 ± 0.04 | 0.2 ± 0 | 0.2 ± 0.03 | 0.29 ± 0.02 |
| **Pb (mg.kg)** | 0.04 ± 0.03 | 0.15 ± 0.08 | 1.26 ± 0.94 | 0.28 ± 0.08 | 0.9 ± 0.22 | 0.5 ± 0.1 | 0.57 ± 0.15 | 0.7 ± 0.08 | 0.2 ± 0.1 | 0.41 ± 0.12 | 0.47 ± 0.13 |
| **Se (mg.kg)** | 0.14 ± 0.06 | 0.06 ± 0.02 | 1.09 ± 0.98 | 0.07 ± 0.02 | 0.11 ± 0.03 | 0.12 ± 0.02 | 0.1 ± 0.03 | 0.06 ± 0.02 | 0.2 ± 0.1 | 0.07 ± 0.02 | 0.08 ± 0.02 |
| **Gypsum (%)** | 1.0 ± 0.0 | 14.0 ± 4.0 | 7.8 ± 1.6 | 4.5 ± 1.5 | 15.9 ± 6.1 | 0.7 ± 0.1 | 7.7 ± 3.1 | 0.7 ± 0.1 | 0.5 ± 0.0 | 5.0 ± 1.5 | 12.4 ± 3.7 |
| **Ca ICPg (%)** | 0.43 ± 0.03 | 3.64 ± 0.91 | 3 ± 0.69 | 1.46 ± 0.32 | 4.47 ± 1.51 | 2.5 ± 1.35 | 3.43 ± 0.88 | 3.74 ± 0.94 | 0.25 ± 0.05 | 2.44 ± 0.61 | 3.58 ± 0.83 |
| **Mg ICPg (%)** | 0.8 ± 0.0 | 1.7 ± 0.4 | 1.9 ± 0.86 | 2.86 ± 0.52 | 1.82 ± 0.5 | 1.06 ± 0.27 | 2.94 ± 0.85 | 2.28 ± 0.53 | 0.65 ± 0.15 | 1.7 ± 0.37 | 1.66 ± 0.27 |
| **Salt Calc Na (%)** | 1.33 ± 0.62 | 4.86 ± 1.59 | 2.52 ± 0.83 | 2.44 ± 1.01 | 1.71 ± 0.41 | 0.21 ± 0.05 | 1.47 ± 0.67 | 0.16 ± 0.06 | 0.2 ± 0.1 | 2.09 ± 0.57 | 2.08 ± 0.61 |
| **Average Flood Duration (days/yr)** | 124 ± 32.5 | 108.6 ± 4.3 | 49.26 ± 19.33 | 38.25 ± 8.93 | 23.44 ± 12.11 | 7.56 ± 2.89 | 17.29 ± 5.63 | 3.2 ± 1.36 | 5.5 ± 1.5 | 19.8 ± 4.42 | 44 ± 8.23 |
| **altitude (m)** | 406.81 ± 1 | 407.83 ± 1.43 | 241.52 ± 97.46 | 406.25 ± 1.56 | 406.32 ± 2.83 | 410.72 ± 1.99 | 408.95 ± 2.88 | 408.09 ± 2.5 | 410.91 ± 0.91 | 407.67 ± 2.6 | 399.82 ± 4.47 |
| **distance from edge (km)** | 2.3 ± 0.3 | 2.53 ± 0.23 | 2.85 ± 0.82 | 2.71 ± 0.43 | 2.75 ± 0.63 | 1.3 ± 0.09 | 1.74 ± 0.3 | 1.07 ± 0.02 | 1.65 ± 0.22 | 3.18 ± 0.85 | 3.2 ± 0.51 |

| | Vegetation Community Groups | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **FA** | **FB** | **G** | **H** | **IA** | **IB** | **JA** | **JB** | **K** | **L** |
| **EC (1:5)** | 866 ± 212.03 | 656.1 ± 158.27 | 210 ± 40 | 7 ± 0 | 274.4 ± 82.72 | 79 ± 43.21 | 103.5 ± 36.5 | 176.33 ± 128.57 | 10.5 ± 3.43 | 620 ± 220.34 |
| **pH (CaCl2)** | 7.76 ± 0.2 | 7.99 ± 0.13 | 7.6 ± 0.1 | 6.4 ± 0.1 | 7.1 ± 0.21 | 7.37 ± 0.23 | 6.35 ± 0.35 | 7.03 ± 0.32 | 7.02 ± 0.48 | 7.95 ± 0.06 |
| **Sand (%).** | 54.8 ± 4.6 | 58.9 ± 4.2 | 66.8 ± 4.8 | 31.5 ± 1.5 | 48.6 ± 3.0 | 55.4 ± 6.4 | 77.5 ± 5 | 72.5 ± 3.79 | 86.58 ± 3.62 | 84.5 ± 3.01 |
| **Silt. (%)** | 32.1 ± 3.45 | 26.95 ± 2.1 | 14.75 ± 3.25 | 38.5 ± 6 | 35 ± 1.6 | 30.33 ± 3.88 | 16.5 ± 3.5 | 11.5 ± 3.01 | 7.02 ± 2.67 | 10.75 ± 3.82 |
| **Clay. (%)** | 13.1 ± 3.64 | 14.1 ± 2.47 | 18.5 ± 1.5 | 30 ± 4.5 | 16.4 ± 2.37 | 14.25 ± 2.67 | 6 ± 1.5 | 16 ± 2.02 | 6.42 ± 1.34 | 4.75 ± 0.92 |
| **N total (%)** | 0.11 ± 0.04 | 0.08 ± 0.01 | 0.11 ± 0 | 0.07 ± 0 | 0.13 ± 0.03 | 0.07 ± 0.01 | 0.02 ± 0 | 0.03 ± 0.01 | 0.03 ± 0.01 | 0.03 ± 0.01 |
| **B (mg.kg)** | 9.48 ± 2.15 | 15.78 ± 4.14 | 7.2 ± 4.8 | 0.35 ± 0.05 | 2.66 ± 0.91 | 0.88 ± 0.23 | 0.2 ± 0.1 | 0.8 ± 0.36 | 0.35 ± 0.13 | 0.83 ± 0.33 |
| **Ca (mg.kg)** | 8006.37 ± 1255.9 | 6752.86 ± 781.41 | 6533.47 ± 3916.63 | 1835.7 ± 58.92 | 5784.99 ± 1933.29 | 3760.47 ± 955.43 | 388.15 ± 89.8 | 1190.3 ± 220.94 | 2055.45 ± 881.85 | 15191.79 ± 552.91 |
| **Cd (mg.kg)** | 0.01 ± 0 | 0 ± 0 | 0.03 ± 0.02 | 0.03 ± 0.01 | 0.02 ± 0.01 | 0.02 ± 0.01 | 0.01 ± 0 | 0.03 ± 0.01 | 0 ± 0 | 0.02 ± 0.01 |
| **Co (mg.kg)** | 1.03 ± 0.22 | 1.09 ± 0.25 | 1.55 ± 0.15 | 4.75 ± 0.25 | 1.68 ± 0.23 | 2.88 ± 0.61 | 2.4 ± 0.1 | 5.2 ± 0.6 | 1.19 ± 0.33 | 0.73 ± 0.07 |
| **Cu (mg.kg)** | 3.92 ± 0.54 | 3.49 ± 0.67 | 4.65 ± 0.85 | 6 ± 0.4 | 3.14 ± 0.72 | 3.75 ± 0.63 | 1.35 ± 0.15 | 3.5 ± 0.47 | 1.33 ± 0.36 | 1.3 ± 0.19 |
| **Fe (mg.kg)** | 204 ± 22.72 | 189 ± 8.88 | 205 ± 25 | 125 ± 15 | 206 ± 24.21 | 123.5 ± 13.03 | 69 ± 5 | 86 ± 4.73 | 58.83 ± 8.46 | 57 ± 7.6 |
| **K (mg.kg)** | 1443.33 ± 185.64 | 1149.31 ± 154.36 | 726.6 ± 52.05 | 574.08 ± 56.78 | 893.9 ± 81.03 | 715.09 ± 60.79 | 609.57 ± 92.74 | 525.04 ± 91.21 | 226.6 ± 68.74 | 395.21 ± 144.88 |
| **Mg (mg.kg)** | 1454.19 ± 164.49 | 2014.05 ± 255.07 | 884.4 ± 257.29 | 611.66 ± 77.5 | 757.79 ± 113.98 | 776.76 ± 62.74 | 140.6 ± 21.2 | 334.77 ± 59.31 | 296.23 ± 107.11 | 433.96 ± 160.51 |
| **Mn(mg.kg)** | 76.6 ± 10.85 | 93.5 ± 17.44 | 160 ± 40 | 220.55 ± 30.55 | 105 ± 20.13 | 161.67 ± 25.87 | 119 ± 21 | 200 ± 15.28 | 74 ± 20.53 | 52 ± 5.58 |
| **Na (mg.kg)** | 6648.23 ± 2379.34 | 4642.27 ± 1491.85 | 590.2 ± 365.89 | 71 ± 30.64 | 1601.5 ± 549.14 | 612.71 ± 354.56 | 955.6 ± 459.2 | 1423.99 ± 1076.42 | 34.89 ± 17.2 | 3431.74 ± 2184.3 |
| **Ni (mg.kg)** | 1.18 ± 0.33 | 1.14 ± 0.22 | 1.55 ± 0.25 | 3.9 ± 0.6 | 1.58 ± 0.19 | 1.68 ± 0.42 | 0.85 ± 0.05 | 2.2 ± 0.06 | 0.48 ± 0.11 | 0.3 ± 0.06 |
| **P (mg.kg)** | 57.6 ± 25.55 | 22.9 ± 2.19 | 38 ± 3 | 11.5 ± 3.5 | 28.8 ± 3.04 | 16.17 ± 2.55 | 13 ± 1 | 10 ± 2 | 13.5 ± 2.77 | 51.5 ± 15.46 |
| **Zn (mg.kg)** | 1.64 ± 0.56 | 1.7 ± 0.43 | 2.1 ± 0.7 | 3.8 ± 0.3 | 2.22 ± 0.27 | 2.45 ± 0.5 | 1.6 ± 0.3 | 2.03 ± 0.15 | 1.27 ± 0.17 | 0.7 ± 0 |
| **As (mg.kg)** | 0.22 ± 0.07 | 0.23 ± 0.02 | 0.25 ± 0.05 | 0.15 ± 0.05 | 0.16 ± 0.05 | 0.1 ± 0.02 | 0.1 ± 0 | 0.13 ± 0.03 | 0.07 ± 0.02 | 0.25 ± 0.03 |
| **Pb (mg.kg)** | 0.22 ± 0.11 | 0.34 ± 0.11 | 0.5 ± 0.4 | 0.1 ± 0 | 0.24 ± 0.13 | 0.47 ± 0.19 | 0.6 ± 0.1 | 0.77 ± 0.07 | 0.48 ± 0.11 | 0.75 ± 0.21 |
| **Se (mg.kg)** | 0.08 ± 0.04 | 0.08 ± 0.02 | 0.06 ± 0.05 | 0.15 ± 0.05 | 0.06 ± 0.02 | 0.09 ± 0.03 | 0.01 ± 0 | 0.1 ± 0.05 | 0.1 ± 0.03 | 0.06 ± 0.03 |
| **Gypsum (%)** | 11.4 ± 5.4 | 3.7 ± 1.1 | 5.8 ± 5.2 | 0.5 ± 0.0 | 2.4 ± 1.0 | 0.6 ± 0.1 | 0.5 ± 0 | 0.7 ± 0.2 | 0.5 ± 0.0 | 43.8 ± 7.1 |
| **Ca ICPg (%)** | 3.3 ± 1.36 | 2.43 ± 0.72 | 2.55 ± 1.75 | 0.2 ± 0 | 1.02 ± 0.4 | 1.78 ± 0.96 | 0.1 ± 0 | 0.13 ± 0.03 | 0.94 ± 0.59 | 11.3 ± 1.69 |
| **Mg ICPg (%)** | 1.44 ± 0.32 | 2.67 ± 0.58 | 1.1 ± 0.2 | 0.45 ± 0.05 | 0.8 ± 0.05 | 1.18 ± 0.33 | 0.3 ± 0 | 0.27 ± 0.07 | 0.39 ± 0.17 | 0.63 ± 0.2 |
| **Salt Calc Na (%)** | 1.84 ± 0.68 | 1.21 ± 0.37 | 0.2 ± 0.1 | 0.01 ± 0 | 0.44 ± 0.14 | 0.2 ± 0.08 | 0.25 ± 0.15 | 0.4 ± 0.3 | 0.03 ± 0.02 | 0.85 ± 0.51 |
| **Average Flood Duration (days/yr)** | 82.4 ± 20.07 | 44.1 ± 10.17 | 110.5 ± 51.5 | 5 ± 1 | 19.2 ± 7.2 | 4.5 ± 1.89 | 0 ± 0 | 0 ± 0 | 0.67 ± 0.67 | 0.5 ± 0.5 |
| **altitude (m)** | 402.37 ± 0.73 | 406.97 ± 1.33 | 411 ± 2 | 410.65 ± 7.65 | 403.73 ± 1.39 | 415.87 ± 3.72 | 417.81 ± 4.81 | 407.48 ± 1.97 | 411.46 ± 1.73 | 413.67 ± 4.46 |
| **distance from edge (km)** | 4.08 ± 0.92 | 1.61 ± 0.15 | 2.13 ± 0.72 | 1.29 ± 0.1 | 1.28 ± 0.12 | 1.16 ± 0.05 | 0.82 ± 0.12 | 0.86 ± 0.05 | 0.8 ± 0.03 | 3.73 ± 0.19 |

### *3.2.3 Fortescue Marsh Vegetation Community Group Descriptions*

Detailed descriptions of each Vegetation Community Group are given in the following section. For each community a list of diagnostic taxa (from SIMPER analysis, 70% cut-off), common (occurring in ≥25% of plots in a community group), and conservation taxa has been compiled. Distribution maps of each vegetation community have been generated in Quantum GIS (QGIS) V. 2.18 (QGIS Development Team 2016). Both the Fortescue Marsh Land System boundary (inner polygon) and 410 m ASL contour (outer polygon) are used to delineate the Marsh area.

# Marsh Land System

## Inundated *Tecticornia/Muellerolimon* communities

### Group A: Species poor *Tecticornia spp.* interior/lake bed samphire shrublands.

### Group AA: *Tecticornia pergranulata* low samphire shrublands.

**Map Unit: 35**

**Vegetation description:** Low samphire shrublands dominanted by *Tecticornia pergranulata* subsp. *pergranulata*, over herb and fern ground layer of taxa such as *Marsilea* spp., *Heliotropium curassavicum, Cressa australis* and *Mimulus* aff. *gracilis* (Figure 11).

**Diagnostic taxa (SIMPER):** *Tecticornia pergranulata* subsp. *pergranulata*

**No plots:** 3

**No species/plot (2014 data only):** 12.3 ±2.3 sp./plot

**No species/plot (total over 2013/2014):** 12.3 ± 2.3 sp./plot

**Common perennial taxa (% frequency): shrubs and samphires:** *Tecticornia pergranulata* subsp. *pergranulata* (100), *Muellerolimon salicorniaceum* (100), *Tecticornia medusa* (67), **herbs and grasses:** *Streptoglossa adscendens* (33), *Sporobolus mitchellii* (33), *Cullen cinereum* (33), *Bergia perennis* subsp. *obtusifolia* (33), *Cressa australis* (100), *Eragrostis dielsii* (33), *Atriplex flabelliformis* (33)

**Physical landform:** Floodplains extending around river channels in the eastern half of the Fortescue Marsh.

In units that Payne & Mitchell (1999) and van Vreeswyk *et al.* (2004) referred to as gilgai plains and flood plains.

**Soils**: Deep (>50 cm), saline, red-brown, silty clay loam.

**Conservation taxa (Priority Conservation Status):** *Atriplex flabelliformis* (3), *Eleocharis papillosa* (3), *Nicotiana heterantha* (1), *Tecticornia medusa* (3)

**Notes:** This community supports the samphire species, *T. pergranulata* and *T. medusa*, which are tolerant of prolonged inundation. This community occurs at the lowest edge of the vegetated zone into the Marsh.

**Figure 11: Community Group AA**: Low samphire shrubland of *Tecticornia pergranulata* subsp. *pergranulata* (survey site FORT27).

**Figure 12: Community Group AB:** Low samphire shrubland of *Tecticornia medusa* and *Tecticornia pergranulata* subsp. *pergranulata* (survey site FORT76)**.**

## Group AB: *Tecticornia medusa* and *Tecticornia pergranulata* samphire shrublands.

### Map Unit: 20

**Vegetation description:** *Tecticornia medusa* and *Tecticornia pergranulata* low samphires shrublands over herb and fern ground layer of taxa such as *Marsilea* spp. *Cressa australis* and *Mimulus* aff. *gracilis* (Figure 12).

**Physical landform:** On the margins of and sometimes extending into the interior of ephemeral lake beds that occur on the extensive saline flood plains of the Fortescue Marsh. Associated with areas of inflow into these lake beds.

**Soils:** Deep (>50 cm, red-brown, silty loam.

**Diagnostic taxa (SIMPER):** *Tecticornia medusa*

**No plots:** 5 (+1 plot allocated post-analysis)

**No species/plot (2014 data only, 5 plots):** 3.6 ± 1.3 sp./plot

**No species/plot (total over 2013/2014):** 3.5 ± 1.2 sp./plot

**Common perennial taxa (% frequency): samphires:** *Tecticornia medusa* (100), *Tecticornia pergranulata* subsp. *pergranulata* (60), *Tecticornia globulifera* (40) **herbs:** *Cressa australis* (40),

**Conservation taxa (Priority Conservation Status):** *Tecticornia globulifera* (1), *Tecticornia medusa* (3), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (1)

**Notes:** Located at the lowest end of the vegetation zone of the Marsh. This is a species poor community of inundation-tolerant samphires and experiences a surge in the cover of annuals and geophytes soon after inundation events.

## Group B: Species poor *Tecticornia* spp. interior shrublands.

## Group BA: *Tecticornia globulifera*/*Tecticornia pergranulata*/*Tecticornia indica* subsp. *bidens* samphire shrublands.

### Map Unit: 27

**Vegetation description:** Mid-dense samphire shrubland of *Tecticornia globulifera* co-occuring with *Tecticornia pergranulata* subsp. *pergranulata*, *Tecticornia auriculata* and/or *Tecticornia medusa*, over a ground layer of herbs and sedges which includes *Eleocharis papillosa*, *Mimulus* aff. *gracilis, Cyperus bulbosus* and/or *Tecticornia verrucosa* (Figure 13).

**Physical landform:** On the extensive saline flood plains and margins of bare lake beds of the Fortescue Marsh interior.

**Soils:** Deep (>50 cm), red-brown, silty loam.

**No plots:** 3 (+2 plots allocated post-analysis)

**No species/plot (2014 data only, 5 plots):** 8.3 ± 2.5 sp./plot

**No species/plot (total over 2013/2014):** 7.4 ± 2.3 sp./plot

**Diagnostic taxa (SIMPER):** *Tecticornia globulifera*

**Common perennial taxa (% frequency):** *Cressa australis* (33), *Tecticornia medusa* (100), *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) (33), *Eragrostis dielsii* (33), *Tecticornia indica* subsp. bidens (33), *Tecticornia auriculata* (67), *Muellerolimon salicorniaceum* (100), *Tecticornia globulifera* (100), *Frankenia ambita* (33), *Maireana luehmannii* (67)

**Conservation taxa (Priority Conservation Status):** *Atriplex flabelliformis* (3), *Eleocharis papillosa* (3), *Nicotiana heterantha* (1), *Tecticornia globulifera* (1), *Tecticornia medusa* (3), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (1)

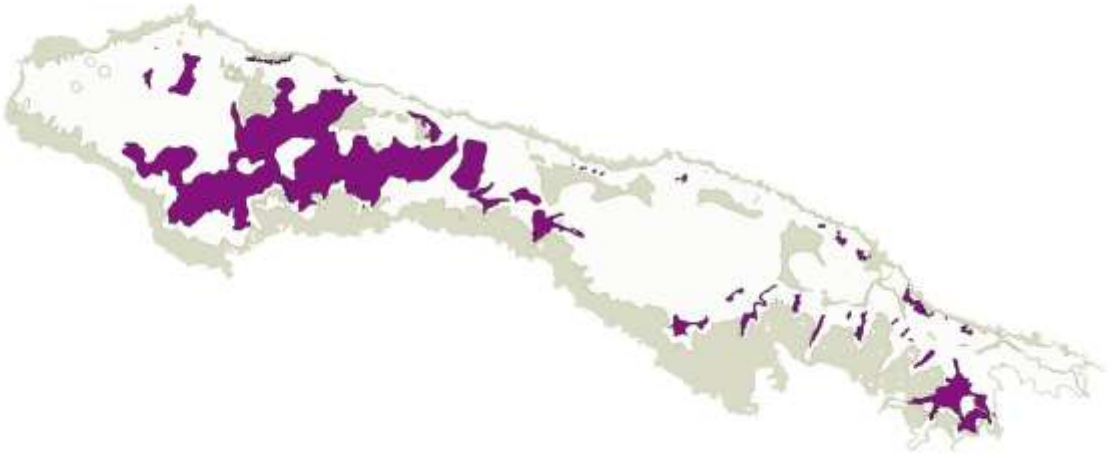
**Notes:** This community occurs at the lowest end of the vegetated zone on the Fortescue Marsh.

**Figure 13: Community Group BA**: Low samphire shrubland of *Tecticornia globulifera* over *Eragrostis dielsii* grassland (survey site FORT118).

**Figure 14: Community Group BB**: Samphire shrubland of *Tecticornia auriculata* over *Eragrostis dielsii* grassland (survey site FORT048).

## Group BB: Species poor *Tecticornia auriculata* samphire shrublands.

### Map Unit: 21



**Vegetation description:** Mid-dense *Tecticornia auriculata* chenopod shrubland over sparse grassland of *Eragrostis dielsii* (Figure 14).

**Physical landform:** On the extensive saline flood plain and lake beds of the Fortescue Marsh.

**Soils:** Deep (>50 cm), saline, red-brown, silty loam or loamy sand.

**No plots:** 8

**No species/plot (2014 data only):** 9.9 ± 5.0 sp/plot

**No species/plot (total over 2013/2014):** 9.8 ± 5.0 sp./plot

**Diagnostic taxa (SIMPER):** *Tecticornia auriculata*

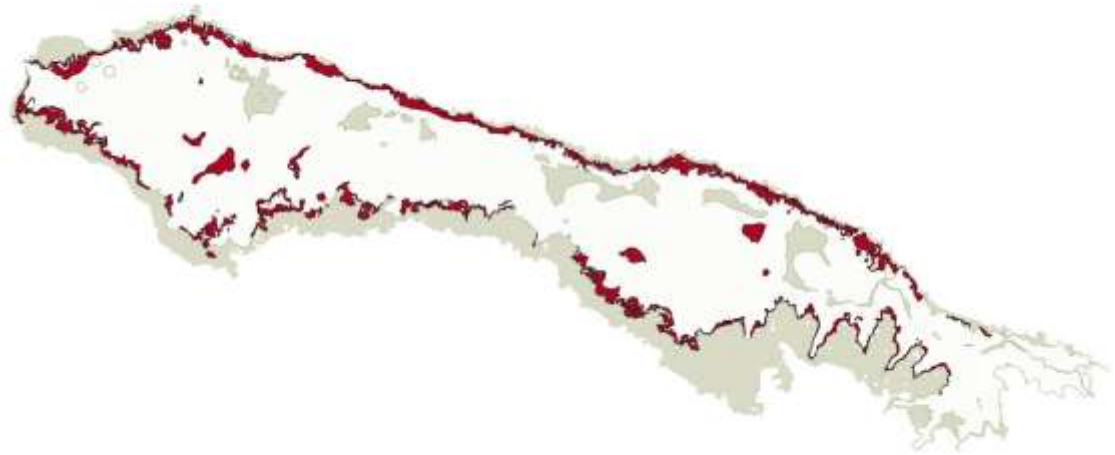
**Common perennial taxa (% frequency):** *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) (75), *Eragrostis dielsii* (62), *Tecticornia indica* subsp. *bidens* (62), *Tecticornia auriculata* (100), *Muellerolimon salicorniaceum* (25), *Tecticornia globulifera* (38)

**Conservation taxa (Priority Conservation Status**): *Eleocharis papillosa* (3), *Eremophila spongiocarpa* (1), *Nicotiana heterantha* (1), *Tecticornia globulifera* (1), *Tecticornia medusa* (3), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (1)

**Notes:** Widespread in the western basin of the Fortescue Marsh and covering large area in saline flats in the southeastern Fortescue Marsh.

## Group C: Marginal *Tecticornia* spp./*Eremophila spongiocarpa* samphire shrublands.

**Map Unit: 22:** Subunits CA and CB have been amalgamated since separate units are indistinguishable on the aerial imagery and more informative as a combined unit.



## Group CA: *Tecticornia indica* subsp. *bidens*, *Eremophila spongiocarpa* mixed samphire shrublands.

**Vegetation description:** Mid-dense mixed samphire shrublands generally composed of *Eremophila spongiocarpa, Tecticornia indica* subsp. *bidens, Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) and *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (K.A. Shepherd & T. Colmer *et al.* KS 1063), over very sparse grasses, subshrubs and herbs, including *Eragrostis dielsii, Swainsona kingii and Frankenia ambita* or *Scaevola collaris* (Figure 15).

**Physical landform:** Mainly on margins of extensive saline flood plains adjacent to the Marsh boundary but also found in the Marsh interior, especially when there are underlying calcrete deposits/subsurface rocky deposits and shallower soils.

**Soils:** Shallow (20–50 cm)–deep (>50 cm), red-brown, silty loam or loamy sand with surface fragments of BIF, quartz and other metasediments. Some surface exposure of calcrete deposits in some sites, and a liverwort soil crust can be found in relatively ungrazed areas.

**No plots: 9** (+3 plots allocated post-analysis)

**No species/plot (2014 data only, n=9):** 15 ± 7.1 sp./plot

**No species/plot (total over 2013/2014, n=9):** 13.6 ± 6.6 ± sp./plot

**Diagnostic taxa (SIMPER):** *Tecticornia indica* subsp. *bidens, Eragrostis dielsii*

**Common perennial taxa (% frequency):** shrubs and **samphires:** *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) (89), *Eremophila spongiocarpa* (67), *Tecticornia indica* subsp. *bidens* (100), *Tecticornia auriculata* (67), *Muellerolimon salicorniaceum* (56), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (67) **low shrubs:** *Frankenia ambita* (67), *Maireana luehmannii*, *Scaevola collaris* (33) (56) **grasses:** *Cenchrus ciliaris* (44), *Eragrostis dielsii* (100)

**Conservation taxa (Priority Conservation Status):** *Atriplex flabelliformis* (3), *Dysphania congestiflora* (1), *Eleocharis papillosa* (3), *Eremophila spongiocarpa* (1), *Nicotiana heterantha* (1), *Tecticornia globulifera* (1), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (1)

**Notes:** Usually located at the start of the vegetated zone at the boundary of the Marsh, but also found in parts of the interior. Generally associated with shallower, rocky soils with low frequency of inundation. *Scaevola collaris* also appears in these shrublands in association with subsurface gypsum deposits.

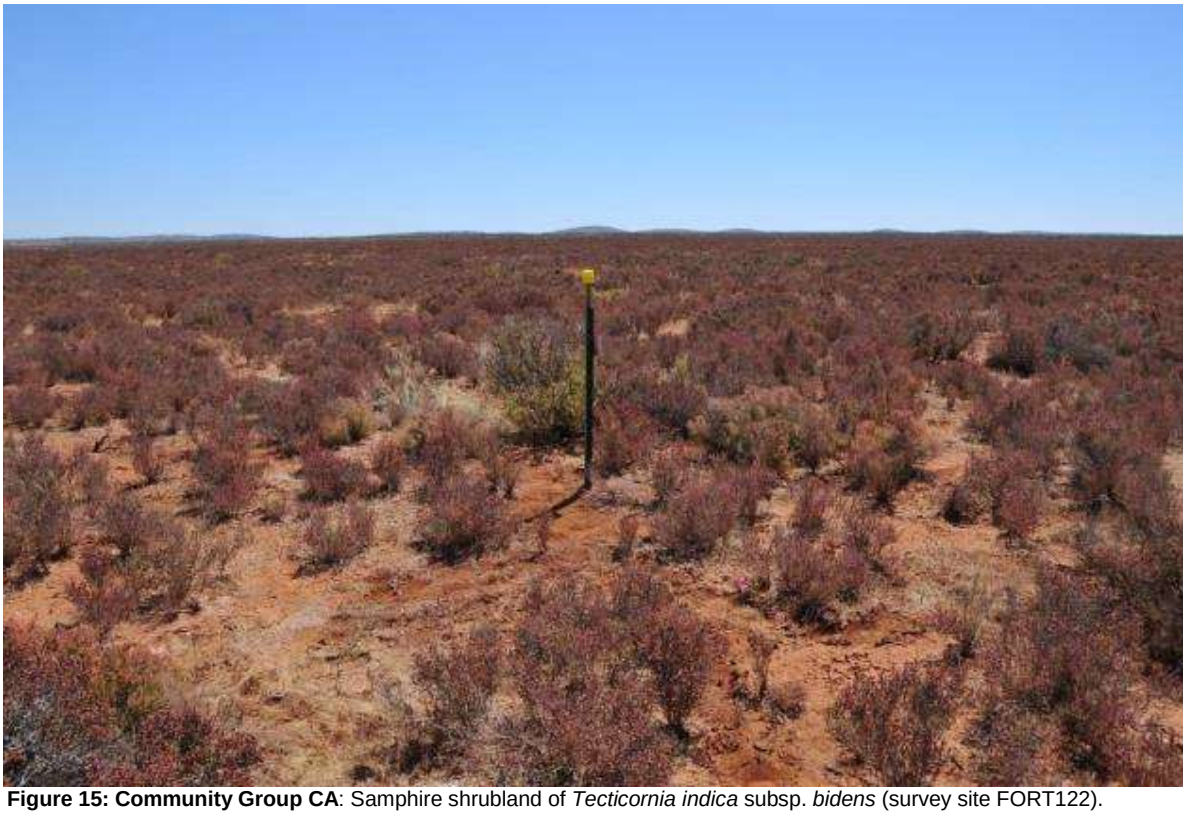


**Figure 15: Community Group CA**: Samphire shrubland of *Tecticornia indica* subsp. *bidens* (survey site FORT122).

**Figure 16: Community Group CB**: Samphire shrubland of *Eremophila spongiocarpa*, *Tecticornia indica* subsp. *bidens* (survey site FORT002).

## Group CB: Marginal *Tecticornia indica* subsp. *bidens*, *Eremophila spongiocarpa* mixed samphire shrublands.

**Vegetation description:** *Tecticornia indica* subsp. *bidens* and *Eremophila spongiocarpa* samphire shrubland over mixed chenopod subshrubs, *Sida fibulifera, Eragrostis dielsii* and various herbs, subshrubs and tussock grasses (Figures 16 & 17).

**Physical landform** Stony flats on margin of extensive saline flood plain.

**Soils:** On shallow (5–50 cm) to deep (>50 cm), gravelly, saline, red-brown loamy sand or silty loam. Some sites slightly rocky with exposed calcrete bedrock.

**No plots: 9**

**No species/plot (2014 data only):** 43 ± 11.0 sp./plot

**No species/plot (total over 2013/2014):** 43.0 ± 11.0 sp./plot

**Diagnostic taxa (SIMPER):** *Tecticornia indica* subsp. *bidens*, *Eragrostis dielsii, Eremophila spongiocarpa, Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552), *Sida fibulifera.*

**Common perennial taxa (% frequency):** *Evolvulus alsinoides* var. *villosicalyx* (33), *Eremophea spinosa* (44), *Solanum lasiophyllum* (56), *Enneapogon caerulescens* (78), *Enneapogon polyphyllus* (67), *Goodenia forrestii* (67), *Sida fibulifera* (100), Streptoglossa bubakii (44), *Maireana amoena* (56), *Abutilon oxycarpum* subsp. Prostrate (33), *Senna* sp. Meekatharra (33), *Streptoglossa decurrens* (33), *Sporobolus mitchellii* (44), *Cullen cinereum* (44), *Enteropogon ramosus* (67), *Paspalidium* aff. *jubiflorum* (44), *Pluchea rubelliflora* (67), *Neptunia dimorphantha* (33), *Pterocaulon sphacelatum* (78), *Rhynchosia australis* (56), *Convolvulus clementii* (33), *Senna artemisioides* subsp. *oligophylla* (33), *Pluchea dunlopii* (33), *Acacia synchronicia* (33), *Cenchrus ciliaris* (89), *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) (89), *Eremophila spongiocarpa* (100), *Eragrostis dielsii* (100), *Tecticornia indica* subsp. *bidens* (100), *Tecticornia auriculata* (56), *Muellerolimon salicorniaceum* (44), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (56), *Maireana luehmannii* (33)

**Conservation taxa (Priority Conservation Status):** *Atriplex flabelliformis* (3), *Calotis squamigera* (1), *Dysphania congestiflora* (1), *Eremophila spongiocarpa* (1), *Eremophila youngii* subsp. *lepidota* (4), *Nicotiana heterantha* (1), *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) (1), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (1)

**Notes**

More taxa and higher cover in CB, while CA is a more species depauperate version of CA

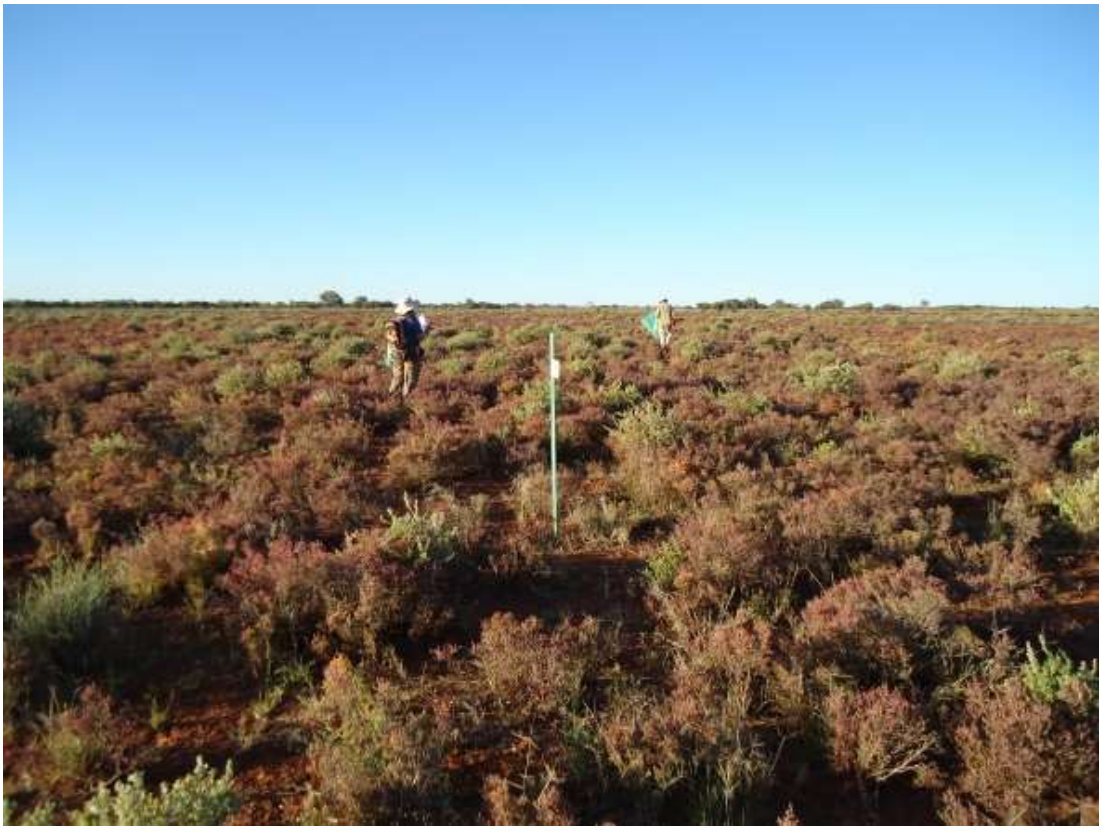


**Figure 17: Community Group CB**: Samphire shrubland of *Eremophila spongiocarpa*, *Tecticornia indica* subsp. *bidens* (survey site FORT022).

## Group D: Marginal *Tecticornia* spp. samphire shrubland communities.

## Group DA: Low *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) samphire shrublands.

**Map Unit: 28**

**Vegetation description:** Mid-dense low samphire shrubland dominated by *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) and with *Tecticornia indica* subsp. *bidens*, over a ground layer of *Eragrostis dielsii* and *Cyperus bulbosus*. Additional taxa includes *Eremophila spongiocarpa*, *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063), *Tecticornia auriculata*, *Dysphania* spp., *Swainsona kingii* and *Cullen cinereum* (Figure 18).

**Physical landform:** From margins to the middle of extensive saline flood plain.

**Soils:** Deep (>50 cm), pale red-brown to light brown, stony, loamy sand or loam. Very slight surface exposure of calcrete outcrop and deposits towards the Marsh interior. A liverwort soil crust forming in relatively ungrazed areas.

**No plots: 7** (+3 plots allocated post-analysis)

**No species/plot (2014 data only, n=7):** 19.9 ± 10.5 sp./plot

**No species/plot (total over 2013/2014, n=7):** 19.9 ± 10.5 sp./plot

**Common perennial taxa (% frequency):** *Enneapogon caerulescens* (43), *Enneapogon polyphyllus* (29), *Sida fibulifera* (29), *Streptoglossa bubakii* (29), *Streptoglossa liatroides* (29), *Cullen cinereum* (29), *Cenchrus ciliaris* (29), *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) (100), *Eremophila spongiocarpa* (71), *Eragrostis dielsii* (100), *Tecticornia indica* subsp. *bidens* (100), *Tecticornia auriculata* (71), *Muellerolimon salicorniaceum* (71), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (29), *Maireana luehmannii* (71), *Scaevola collaris* (29)

**Conservation taxa (Priority Conservation Status):** *Dysphania congestiflora* (1), *Eremophila spongiocarpa* (1), *Nicotiana heterantha* (1), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (1)

**Diagnostic taxa (SIMPER):** *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552), *Eragrostis dielsii*

**Notes**: Typically found as expanses on plains of gravelly, cracking or crumbling/friable clays**,** but also found as pockets between stands of tall *Muellerolimon salicorniaceum* along southern Marsh edges, or as patches along northern edge of the Marsh.

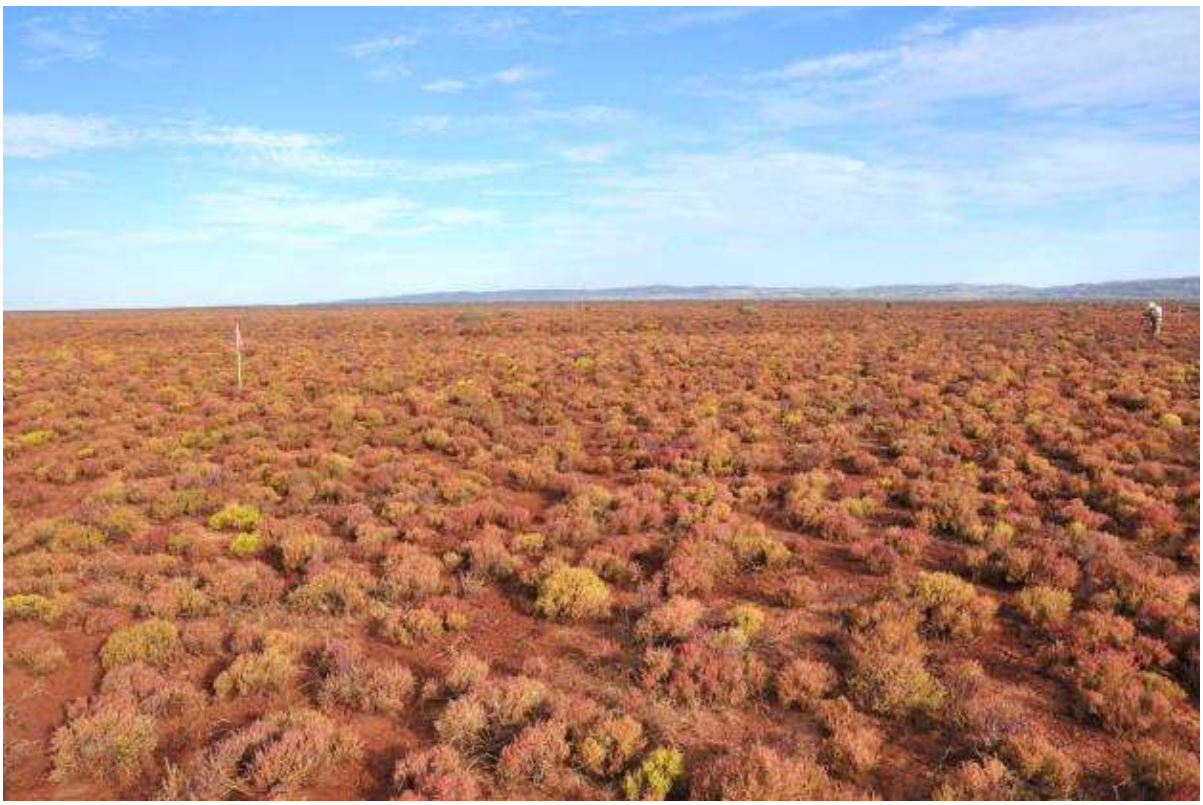


**Figure 18: Community Group DA:** Low samphire shrubland of *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) (survey site FORT072)**.**

**Figure 19: Community Group DB:** *Melaleuca xerophila* sparse shrubland over samphires (survey site FORT015)**.**

## Group DB: Tall *Melaleuca xerophila* over samphires and chenopods marginal shrublands.

### Map Unit: 23

**Vegetation description:** *Melaleuca xerophila* tall shrubland over sparse to mid-dense, predominantly chenopod shrubland of *Rhagodia eremaea*, *Eremophila spongiocarpa, Tecticornia* spp., over low subshrubs of *Eremophea spinosa, Enchylaena tomentosa* var. *tomentosa* and *Maireana luehmannii* and very sparse ground layer of *Eragrostis dielsii*, *Pluchea* spp. and *Lawrencia densiflora*. Other taxa includes *Melaleuca glomerata*, *Triodia longiceps*, *Sporobolis caroli*, *Nicotiana heterantha* and *Eremophea spinosa* (Figure 20).

**Physical landform:** On the margins of the Fortescue Marsh saline plains which abut the calcrete plains of the Calcrete Land System.

**Soils:** Deep (>50 cm), gravelly, saline, red-brown to pale brown loamy sand or silty loam.

**No plots: 5**

**No species/plot (2014 data only, n=5): 30.8** ± 7.2 sp./plot

**No species/plot (total over 2013/2014, n=5):** 30.8 ± 7.2 sp./plot

**Diagnostic taxa (SIMPER):** *Eragrostis dielsii, Melaleuca xerophila, Eremophila spongiocarpa, Tecticornia indica* subsp. *bidens, Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552)*, Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063)*, Eremophea spinosa, Enchylaena tomentosa* var. *tomentosa, Maireana luehmannii*

**Common perennial taxa (% frequency):** *Streptoglossa odora* (40), *Eremophea spinosa* (100), *Einadia nutans* subsp. *eremaea* (60), *Solanum lasiophyllum* (100), *Enneapogon caerulescens* (60), *Goodenia forrestii* (60), *Sida fibulifera* (80), *Streptoglossa bubakii* (60), *Pterocaulon sphacelatum* (40), *Enchylaena tomentosa* var. *tomentosa* (100), *Scaevola spinescens* (60), *Atriplex bunburyana* (60), *Cenchrus ciliaris* (80), *Melaleuca glomerata* (60), *Triodia longiceps* (40), *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) (100), *Eremophila spongiocarpa* (100), *Eragrostis dielsii* (100), *Tecticornia indica* subsp. *bidens* (80), *Tecticornia auriculata* (40), *Muellerolimon salicorniaceum* (80), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (80), *Maireana luehmannii* (100), *Melaleuca xerophila* (80), *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) (60), *Aerva javanica* (40)

**Conservation taxa (Priority Conservation Status):** *Atriplex flabelliformis* (3), *Eremophila spongiocarpa* (1), *Nicotiana heterantha* (1), *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) (1), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (1)

**Notes:** This community was found to be restricted to southern edge of the Fortescue Marsh fringing parts of the calcrete boundary. The *Melaleuca xerophila* presence indicating freshwater groundwater inputs from adjacent calcrete edge**.** Towards the east, the density of understory samphires declines and gives way to low chenopod subshrubs (*Sclerolaena* and *Maireana* spp.) (Figure 17), and this community may transition to another *Melaleuca xerophila* shrubland community in the southeast part of its range. On furthest eastern edge of the Fortescue Marsh, aerial imagery suggests stands of *Melaleuca xerophila* co-occur with *Eucalyptus* trees among expanses of sparse open chenopod shrubland. Surveying these eastern areas is required to verify community type.

**Figure 20: Community Group DB:** *Melaleuca xerophila* sparse shrubland over scattered *Eremophila spongiocarpa* and sparse low chenopod subshrubs (*Maireana* spp., *Sclerolaena* spp.) (adjacent to survey site FORT038)**.**

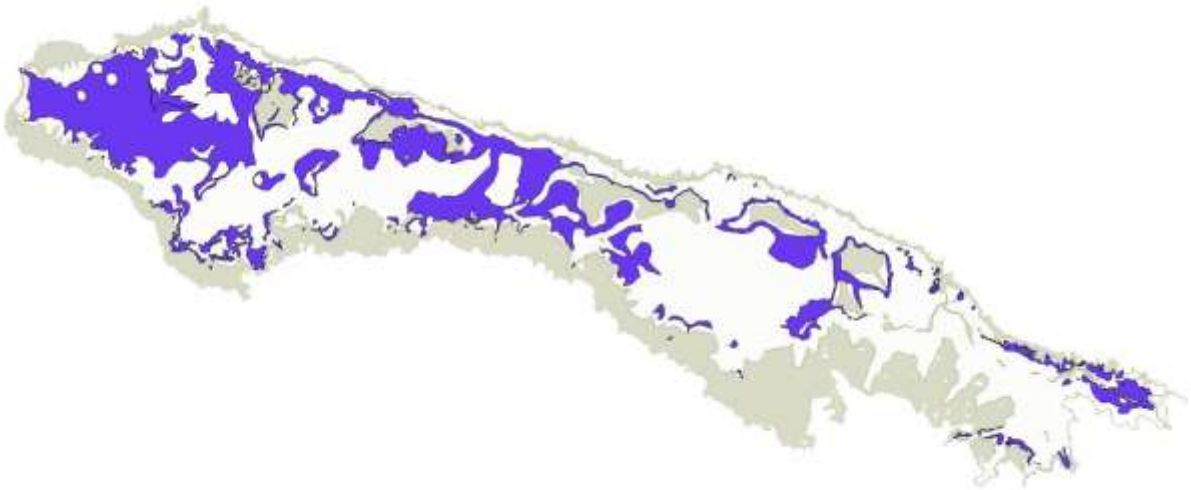
**Figure 21: Community Group EA:** *Tecticornia auriculata*, *Tecticornia indica*, *Eremophila spongiocarpa* mixed samphire shrubland (survey site FORT020).

# Interior – Margin samphire/shrubland communities

## Group E: *Tecticornia auriculatalTecticornia indica* samphire shrubland communities.

### Map Unit: 29:

Groups EA, EB and EC have been amalgamated as a single map unit since these are indistinguishable on aerial imagery and more informative as a combined, albeit relatively heterogeneous, unit.



## Group EA: *Tecticornia auriculata*, *Tecticornia indica*, *Eremophila spongiocarpa* mixed samphire shrubland.

**Vegetation description:** Mid-dense shrublands of *Eremophila spongiocarpa*, *Tecticornia indica* subsp. *leiostachya*, *Tecticornia indica* subsp. *bidens*, *Atriplex amnicola*, over a ground layer of *Eragrostis dielsii* and *Cullen cinereum* (Figure 21).

**Physical landform**: On the margins of extensive saline flood plain, possibly receiving some freshwater drainage from adjacent calcrete or stony plains abutting the Marsh.

**Soils:** Deep (>50 cm), red-brown, loam to silty clay loam. Surface fragments rocks (BIF, calcrete and associated metasediments).

**No plots: 2**

**No species/plot (2014 data only, n=2):** 20.5 ± 4.9 sp./plot

**No species/plot (total over 2013/2014, n=2):** 20.5 ± 4.9 sp./plot

**Diagnostic taxa (SIMPER):** *Eragrostis dielsii, Tecticornia indica* subsp*. bidens, Tecticornia indica* subsp*. leiostachya, Atriplex amnicola, Cullen cinereum*

**Common perennial taxa (% frequency**): **shrubs and samphires:** *Vachellia farnesiana* (50), *Atriplex amnicola* (100), *Tecticornia indica* subsp. *leiostachya* (100), *Tecticornia pergranulata* subsp. *pergranulata* (50), *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) (100), *Eremophila spongiocarpa* (100), *Tecticornia indica* subsp. *bidens* (100), *Tecticornia auriculata* (100), *Muellerolimon salicorniaceum* (50), *Tecticornia globulifera* (100), *Maireana luehmannii* (50) **low shrubs:** *Neptunia dimorphantha* (50) **herbs and grasses:** *Panicum decompositum* (100), *Streptoglossa adscendens* (100), *Streptoglossa liatroides* (50), *Eriochloa pseudoacrotricha* (50), *Cullen cinereum* (100), *Eragrostis dielsii* (100)

**Conservation taxa (Priority Conservation Status):** *Eremophila spongiocarpa* (1), *Nicotiana heterantha* (1), *Tecticornia globulifera* (1)

**Notes:** This group is based on only two plots, so has been under-sampled, but it differs from Group EB and Group EC by the absence of *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063), and a greater cover of *Eremophila spongiocarpa, Tecticornia indica* subsp. *leiostachya*, *Tecticornia globulifera, Tecticornia* sp. Dennys Crossing and *Cullen cinereum*. This group appears to occur on alluvial flats between the Upper Fortescue River and surrounding colluvial plains, in the north-eastern corner of the Fortescue Marsh. Further sampling of these areas will refine the definition of this community.

## Group EB: *Tecticornia indica* subsp. *bidens* and *Tecticornia auriculata* vegetation community.

**Vegetation description:** Shrublands dominated by *Tecticornia indica* subsp. *bidens* and *Tecticornia auriculata* over a ground layer of *Eragrostis dielsii*, becoming shrubby grasslands in parts. Additional taxa include *Eremophila spongiocarpa, Muellerolimon salicorniaceum, Swainsona kingii, Nicotiana heteranthera* and *Frankenia ambita* (Figure 22).

**Physical landform:** Margins to interiors of the extensive saline flood plain and lake bed of the Fortescue Marsh.

**Soils:** Ranging from skeletal to deep (>50 cm) to skeletal (<5cm), red-brown to pale-brown, loam, silty loam or loamy sand. Occasional surface fragments of shells and rocks (BIF, calcrete, gypsum and associated metasediments)

**No plots: 10 (**+2 plots allocated post-analysis)

**No species/plot (2014 data only, n=10):** 20.2 ± 15.1 sp./plot

**No species/plot (total over 2013/2014, n=10):** 18.8 ± 14.1 sp./plot

**Diagnostic taxa (SIMPER):** *Eragrostis dielsii, Tecticornia indica* subsp. *bidens, Tecticornia auriculata*

**Common perennial taxa (% frequency): shrubs and samphires:** *Tecticornia indica* subsp. *bidens* (100), *Tecticornia auriculata* (100), *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) (70), *Eremophila spongiocarpa* (50), *Muellerolimon salicorniaceum* (80), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (80) **low shrubs:** *Maireana luehmannii* (90), *Frankenia ambita* (40) **herbs and grasses:** *Eragrostis dielsii* (100), *Streptoglossa bubakii* (30), *Pluchea rubelliflora* (30)

**Conservation taxa (Priority Conservation Status):** *Atriplex flabelliformis* (3), *Dysphania congestiflora* (1), *Eleocharis papillosa* (3), *Eremophila spongiocarpa* (1), *Nicotiana heterantha* (1), *Tecticornia globulifera* (1), *Tecticornia medusa* (3), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (1)

**Notes:** This is a heterogeneous community group in terms of species abundance and structure. Relative to Group EA and EC, *Tecticornia indica* subsp. *bidens* is more abundant and *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) is restricted to this subgroup.

**Figure 22: Community Group EB:**

**Top**: *Tecticornia auriculata* and *Tecticornia indica* subsp. *bidens* samphire shrubland over *Eragrostis dielsii* grassland (survey site FORT101).

**Bottom**: *Tecticornia indica* subsp., *bidens* and *Muellerolimon salicorniaceum* shrubland (survey site FORT036).

## Group EC: *Muellerolimon salicorniaceum, Tecticornia auriculata* samphire shrublands.

**Vegetation description:** Samphire shrublands of *Muellerolimon salicorniaceum*, *Tecticornia auriculata* and/or *Tecticornia indica* subsp. *bidens* over a ground layer of *Eragrostis dielsii*, *Frankenia ambita* and *Cyperus bulbosus*. Varies from mid-dense samphire shrublands to very sparse, scattered shrubs over mid-dense expanses of *Eragrostis dielsii* tussock grassland (Figure 23).

**Physical landform:** From the margins to interiors of the extensive saline flood plains and lake beds of the Fortescue Marsh.

**Soils:** Deep (>50 cm), red-brown, loam to silty loam to loamy sand. Occasional surface fragments of shells and rocks (BIF, calcrete, gypsum and associated metasediments)

**Diagnostic taxa (SIMPER):** *Eragrostis dielsii, Muellerolimon salicorniaceum*

**No plots: 11**

**No species/plot (2014 data only, n=10):** 10.7 ± 2.3 sp./plot

**No species/plot (total over 2013/2014, n=10):** 10.7 ± 2.4 sp./plot

**Common perennial taxa (% frequency): shrubs and samphires:** *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) (27), *Eremophila spongiocarpa* (18), *Eragrostis dielsii* (100), *Tecticornia indica* subsp. *bidens* (91), *Tecticornia auriculata* (64), *Muellerolimon salicorniaceum* (64), *Tecticornia globulifera* (64**) low shrubs:** *Frankenia ambita* (82), *Maireana luehmannii* (36)

**Conservation taxa (Priority Conservation Status):** *Eleocharis papillosa* (3), *Eremophila spongiocarpa* (1), *Nicotiana heterantha* (1), *Tecticornia globulifera* (1)

**Notes:** A heterogeneous unit ranging from *Muellerolimon salicorniaceum* and/or *Tecticornia indica* subsp. *bidens* dominated shrublands, to shrubby *Eragrostis dielsii* grasslands. Sites classified as this group were found to be widespread across the Fortescue Marsh. Group EC has comparatively more cover of *Muellerolimon salicorniaceum* and less *Eremophila spongiocarpa* than groups EA and EB.

**Figure 23: Community Group EC:**

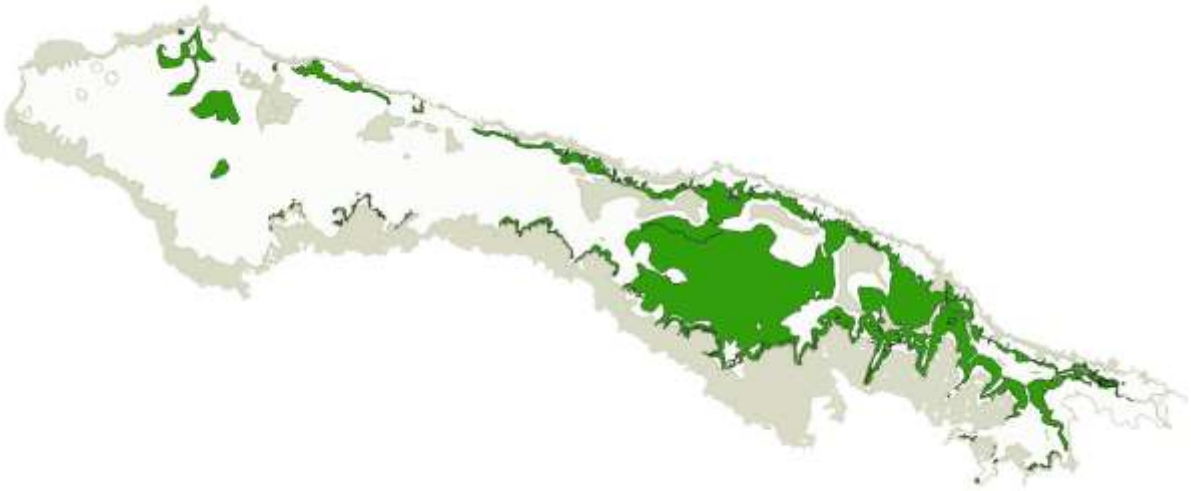
**Top**: *Tecticornia auriculata* and *Muellerolimon salicorniaceum* shrubland over *Eragrostis dielsii* grassland (survey site FORT067).

**Bottom**: Isolated shrubs of *Acacia synchronicia* and *Tecticornia indica* subsp. *bidens* over *Eragrostis dielsii* grassland (survey site FORT116).

## Group F: *Muellerolimon salicorniaceum*/*Tecticornia* spp. samphire shrubland communities.

### Map Unit: 6

Groups FA and FB have been amalgamated as a single map unit since these are indistinguishable on aerial imagery and more informative as combined unit.
Widespread across the Fortescue Marsh, with the greatest coverage in the eastern basin.



## Group FA: *Muellerolimon salicorniaceum* and *Tecticornia indica* subsp. *bidens* samphire shrublands.

**Vegetation description:** Shrublands of *Muellerolimon salicorniaceum* and *Tecticornia indica* subsp. *bidens*, over a ground layer which includes *Eragrostis dielsii, Mimulus* aff. *gracilis, Swainsona tanamiensis, Nicotiana heterantha* and *Cressa australis* (Figure 24).

**Diagnostic taxa (SIMPER):** *Tecticornia indica* subsp. *bidens*, *Muellerolimon salicorniaceum*, *Eragrostis dielsii*

**Physical landform:** Margins to interiors of the extensive saline flood plains and lake beds of the Fortescue Marsh.

**Soils:** Deep (>50 cm), red-brown to grey-brown, loam to silty loam. Often with surface fragments of shells.

**No plots: 5 (**+1 plot allocated post-analysis)

**No species/plot (2014 data only, n=5):** 14.0 ± 4.5 sp./plot

**No species/plot (total over 2013/2014, n=5):** 13.2 ± 4.5 ± sp./plot

**Common perennial taxa (% frequency): shrubs and samphires:** *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) (40), *Tecticornia indica* subsp. *bidens* (100), *Tecticornia auriculata* (40), *Muellerolimon salicorniaceum* (80), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (40), *Tecticornia globulifera* (40) **low shrubs:** *Frankenia ambita* (60), *Maireana luehmannii* (60), **herbs and grasses:** *Eragrostis dielsii* (80), *Cressa australis* (60), *Atriplex flabelliformis* (80)

**Conservation taxa (Priority Conservation Status):** *Atriplex flabelliformis* (3), *Eleocharis papillosa* (3), *Nicotiana heterantha* (1), *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) (1), *Tecticornia globulifera* (1), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (1)

**Notes:** Sites classified as this community were widely distributed across the Fortescue Marsh. Small stands of this community long the northern edge of the Marsh also support mid-dense sedgelands of *Typha domingensis*. This community is subject to frequent inundation, which the tall *M. salicorniaceum* survives but which reduces *T. indica* subsp. *bidens* to mid-dense, even-aged stands of young plants.

Compared to Group FB, Group FA has a relatively greater abundance of *T. indica* subsp. *bidens*, *T.* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) *T. auriculata* and *Panicum decompositum.* Otherwise, it has less cover of *M. salicorniaceum* and other samphire species.

**Figure 24: Community Group FA:** tall *Muellerolimon salicorniaceum* shrubland over *Tecticornia indica* subsp*. bidens* shrubs and a ground layer of *Tecticornia indica* seedlings and *Mimulus* aff. *gracilis* herbs (survey site FORT092).

## Group FB: *Muellerolimon salicorniaceum* and mixed *Tecticornia* samphire shrublands.

**Vegetation description:** Shrublands of *Muellerolimon salicorniaceum* over mixed samphire shrublands of *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) and *Tecticornia indica* subsp. *bidens*, over ground stratum which includes subshrubs, herbs and grasses of *Frankenia ambita, Cressa australis, Cullen cinereum, Eragrostis dielsii, Swainsona tanamiensis, Marsilea drummondii* and *Nicotiana heterantha* (Figure 25)*.*

**Physical landform:** On margins and ranging into the interior of extensive saline flood plain and lake bed, and extending along the flood zone adjacent to semi-permanent/permanent freshwater pools, riverbanks and drainage channels.

**Soils:** Deep (>0.5 m), pale brown to red-brown, silty loam or loamy sand soils. Sometimes with surface fragments of calcrete and shells.

**No plots: 10 (**+2 plot allocated post-analysis)

**No species/plot (2014 data only, n=5):** 16.4 ± 6.1 sp./plot

**No species/plot (total over 2013/2014, n=5):** 15.5 ± 6.0 sp./plot

**Diagnostic taxa (SIMPER):** *Muellerolimon salicorniaceum, Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063), *Tecticornia auriculata*

**Common perennial taxa (% frequency):** *Cullen cinereum* (30), *Tecticornia indica* subsp. *leiostachya* (40), *Cressa australis* (60), *Tecticornia pergranulata* subsp. *pergranulata* (30), *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) (80), *Eragrostis dielsii* (80), *Tecticornia indica* subsp. *bidens* (90), *Tecticornia auriculata* (100), *Muellerolimon salicorniaceum* (100), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (80), *Frankenia ambita* (40), *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) (30)

**Conservation taxa (Priority Conservation Status):** *Atriplex flabelliformis* (3), *Eleocharis papillosa* (3), *Eremophila spongiocarpa* (1), *Nicotiana heterantha* (1), *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) (1), *Tecticornia globulifera* (1), *Tecticornia medusa* (3), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (1)

**Notes:** As with Group FA, this community is periodically inundated and sites of this community are widely distributed across the Marsh. Relative to Group FA, Group FB has a greater abundance of *M. salicorniaceum*, *T*. sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063), *T.* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) *T. auriculata* and *T. pergranulata*.

**Figure 25: Community Group FB:** Tall *Muellerolimon salicorniaceum* shrubland (survey site FORT019).

**Figure 26: Community Group G:** Tall *Eucalyptus camaldulensis* subsp. *obtusa* riparian woodlands and *Acacia ampliceps* shrublands along semi-permanent/permanent freshwater pools (survey site FORT035).

## Freshwater / Alluvial Marsh Margin Communities

## Group G: Riparian *Acacia ampliceps* shrublands and *Eucalyptus camaldulensis* subsp. *obtusa* woodlands.

### Map Unit: 19

**Vegetation description:** Dense, narrow stand of *Acacia ampliceps* and/or *Eucalyptus camaldulensis* subsp. *obtusa* over low shrubs of *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) and a ground cover of clay-bank annual herbs (*Heliotropium curassavicum*, *Trigonella suavissima*, *Polygonum plebeium* and *Centipeda* spp.) (Figure 26).

**Physical landform:** Riparian vegetation on banks along semi-permanent/permanent freshwater pools and freshwater channels.

**Soils:** Deep (>0.5 m), red-brown loam

**No plots: 2**

**No species/plot (2014 data only, n=2):** 26.0 ± 1.4 sp./plot

**No species/plot (total over 2013/2014, n=2):** 26.0 ± 1.4 sp./plot

**Diagnostic taxa (SIMPER):** *Acacia ampliceps* and *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702)

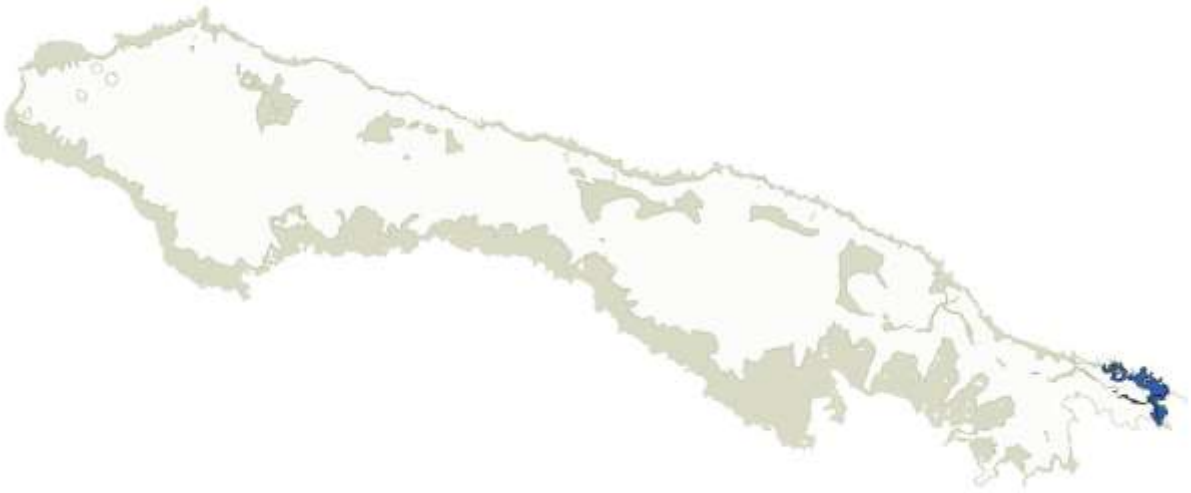
**Common perennial taxa (% frequency): trees-tall shrubs:** *Eucalyptus camaldulensis* subsp. *obtusa* (50), *Acacia ampliceps* (100), *Melaleuca glomerata* (50), *Vachellia farnesiana* (50), **shrubs:** *Atriplex amnicola* (50), *Duma florulenta* (50), *Muellerolimon salicorniaceum* (50), **samphires:** *Tecticornia pergranulata* subsp. *pergranulata* (50), **herbs and grasses:** *Eriochloa pseudoacrotricha* (50), *Sporobolus mitchellii* (50), *Cullen cinereum* (100), *Cenchrus ciliaris* (50), *Cressa australis* (50), *Eragrostis dielsii (*50), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (50), *Frankenia ambita* (100), *Cynodon dactylon* (50), *Atriplex flabelliformis* (50), *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) (A. Markey & R. Coppen FM 9702) (100),

**Conservation taxa (Priority Conservation Status):** *Atriplex flabelliformis* (3), *Eleocharis papillosa* (3), *Nicotiana heterantha* (1), *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) (1), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (1)

**Notes:** Being a riparian community, Group G is restricted to the margins of semi-permanent/permanent freshwater channels along the Upper Fortescue River in the eastern reaches of the Fortescue Marsh. Flood events will inundate this community.

## Group H: Floodplain alluvial *Eucalyptus victrix, Acacia coriacea* open woodland and saltbush shrublands.

### Map Unit: 31



**Vegetation description:** Open woodland or isolated trees of *Acacia coriacea* subsp. *pendans*, *Melaleuca glomerata* and *Vachellia farnesiana* over shrubland of *Atriplex amnicola* and *Duma florulenta* and a ground layer which includes *Eriochloa pseudoacrotricha, Eragrostis leptocarpa,* or *Sporobolis mitchellii, Cullen cinereum, Neptunia dimorphantha* and *Streptoglossa* spp. (Figure 27).

**Physical landform:** On alluvial floodplains and flats at the headwaters of the Upper Fortescue River as it enters the Fortescue Marsh, and associated drainage lines from Chichester Ranges draining into the north-east of the Fortescue Marsh.

**Soils:** Deep (>0.5 m), red-brown, silty clay loam soils.

**No plots: 2**

**No species/plot (2014 data only, n=2):** 31.0 ± 1.4 sp./plot

**No species/plot (total over 2013/2014, n=2):** 31.0 ± 1.4 sp./plot

**Diagnostic taxa (SIMPER):** *Atriplex amnicola, Eriochloa pseudoacrotricha, Vachellia farnesiana, Acacia coriacea* subsp. *pendens, Cullen cinereum*

**Common perennial taxa (% frequency): tall shrubs-shrubs:** *Acacia coriacea* subsp. *pendens* (100), *Acacia synchronicia* (50), *Melaleuca glomerata* (50), *Vachellia farnesiana* (100), *Atriplex amnicola* (100), *Duma florulenta* (100), *Scaevola spinescens* (50), *Eremophila spongiocarpa* (50), **samphires:** *Tecticornia indica* subsp. *bidens* (100), *Tecticornia indica* subsp. *leiostachya* (50), *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) (100), *Tecticornia auriculata* (100), **low shrubs:** *Sclerolaena diacantha* (50), *Neptunia dimorphantha* (100), **herbs and grasses:** *Teucrium racemosum* (50), *Sclerolaena cuneata* (50), *Panicum decompositum* (50), *Sida fibulifera* (50), *Streptoglossa adscendens* (50), *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) (50), *Eragrostis dielsii* (100), *Eriochloa pseudoacrotricha* (100), *Cullen cinereum* (100), *Enteropogon ramosus* (50), *Paspalidium* aff. *jubiflorum* (50), *Sporobolus mitchellii* (50), *Rhynchosia australis* (50), *Pterocaulon sphacelatum* (50), *Cenchrus ciliaris* (50), *Bergia perennis* subsp. obtusifolia (50), *Cressa australis* (50), *Convolvulus clementii* (50),

**Conservation taxa (Priority Conservation Status):** *Eremophila spongiocarpa* (1), *Nicotiana heterantha* (1), *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) (1),

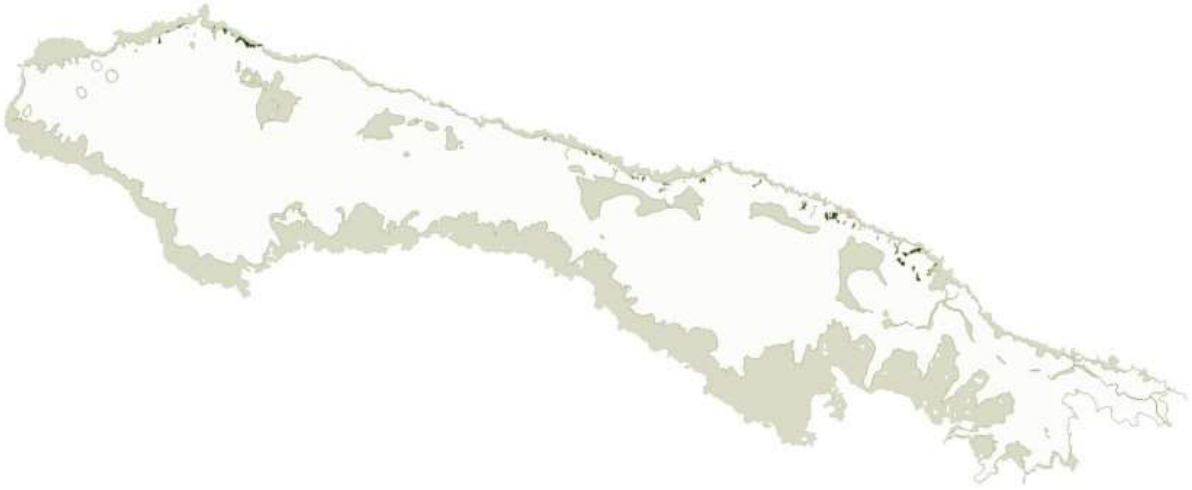
**Notes:** Only two plots were classified as this community, and further sampling will further define and possibly expand the description of this community to include *Eucalyptus victrix* (which was observed adjacent to these plots in drainage lines). Further survey is required to confirm the association of this community with the eastern alluvial flats in the far eastern edge of the Fortescue Marsh.

**Figure 27: Community Group H:** Isolated trees of *Melaleuca glomerata* and *Acacia coriacea* subsp. *pendens* over very sparse shrubs of *Vachellia farnesiana*, over mid-dense shrubland of *Duma florulenta* and *Atriplex amnicola*, over sparse grasses and herbs (survey site FORT091).

**Figure 28: Community Group IA:** Sparse shrubs of *Acacia victoriae*, *Duma florulenta*, *Triodia longiceps* and *Tecticornia indica* subsp. *bidens* over mid-dense grassland of *Eragrostis dielsii* and *Sporobolus mitchellii* (survey site FORT124).

## Group I: Communities associated with freshwater surface - subsurface flow on the Fortescue Marsh margin.

## Group IA: Lignum (*Duma florulenta)* and samphire shrublands/*Sporobolis* grasslands.



### Map Unit: 24

**Vegetation description:** Shrublands of *Vachellia farnesiana*, *Acacia victoriae*, *Acacia synchronicia* and lignum (*Duma florulenta),* over samphires (*Tecticornia indica* subsp. *bidens*, *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063), over a ground layer dominated by *Sporobolis mitchellli*, and supporting *Sida fibulifera, Solanum morrisonii, Eragrostis dielsii* and *Cullen cinereum.* Sometimes with a tall shrubland overstory of *Acacia synchronicia, Acacia sclerosperma* subsp. *sclerosperma* and/or *Melaleuca glomerata* (Figure 28).

**Physical landform** Gravelly flats where freshwater from colluvial and calcrete plains drains onto the margin of the extensive saline flood plains of the Fortescue Marsh. Found along the northern boundary of the Fortescue Marsh (often in proximity to calcrete).

**Soils:** Deep (>50c m) red-brown, silty loam with surface fragments of calcrete, BIF & associated metasediments.

**No plots: 5**

**No species/plot (2014 data only, n=5): 36.0** ± 12.3 sp./plot

**No species/plot (total over 2013/2014, n=5):** 36.0 ± 12.4 sp./plot

**Diagnostic taxa (SIMPER**): *Sporobolus mitchellii, Tecticornia indica* subsp. *bidens, Duma florulenta, Eragrostis dielsii, Cullen cinereum, Eremophila spongiocarpa*

**Most common perennial taxa (% frequency): trees-tall shrubs-shrubs:** *Eremophila spongiocarpa* (100), *Vachellia farnesiana* (80), *Duma florulenta* (100), *Acacia tetragonophylla* (40), *Acacia synchronicia* (60), *Melaleuca glomerata* (40), *Acacia sclerosperma* subsp. *sclerosperma* (40), *Muellerolimon salicorniaceum* (60), *Acacia victoriae* (40), **samphires:** *Tecticornia auriculata* (40), *Tecticornia indica* subsp. *bidens* (100), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (60), *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) (80), *Tecticornia indica* subsp. *leiostachya* (60), **low shrubs:** *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) (80), *Solanum morrisonii* (60), *Einadia nutans* subsp. *eremaea* (40), *Sida fibulifera* (60), *Abutilon cryptopetalum* (40), *Sclerolaena cuneata* (40), *Frankenia ambita* (40), *Enchylaena tomentosa* var. *tomentosa* (40), **herbs and grasses:** *Triodia longiceps* (40), *Cressa australis* (40), *Cenchrus ciliaris* (60), *Trianthema turgidifolium* (40), *Streptoglossa bubakii* (40), *Pterocaulon sphacelatum* (40), *Pluchea rubelliflora* (100), *Paspalidium* aff. *jubiflorum* (80), *Enteropogon ramosus* (40), *Cullen cinereum* (100), *Pluchea dunlopii* (40), ), *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727) (40), *Sporobolus mitchellii* (100), *Eragrostis dielsii* (100), *Ipomoea muelleri* (40),

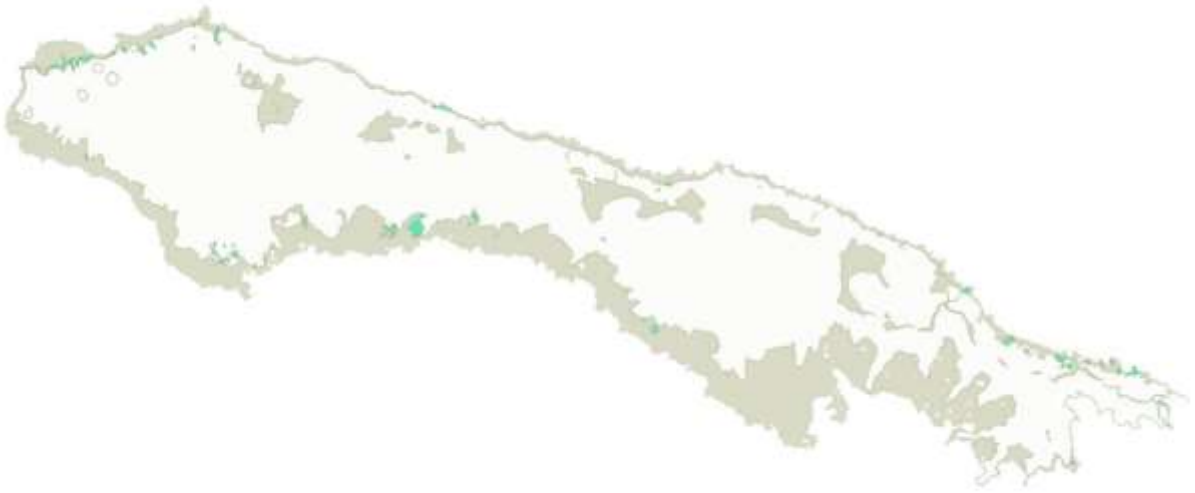
**Conservation taxa (Priority Conservation Status):** *Atriplex flabelliformis* (3), *Eremophila spongiocarpa* (1), *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727) (3), *Nicotiana heterantha* (1), *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) (1), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (1)

**Notes:** These shrublands can grade into large patches of *Sporobolis mitchellli* grassland, which was mapped as part of this unit. Group IA has higher *Sporobolis mitchellii* cover and lacks many of the tall shrub and tree taxa cover found in Group IB, thereby making it the more open, species-poor, grassy shrubland counterpart of Group IB. *Triodia longiceps* hummocks will occur in this community owing to a close proximity to *Triodia* grasslands.

There is a possibility that this community may occur near the Weeli Wolli creek inflow onto the Fortescue Marsh, but further survey is required.

## Group IB: *Eucalyptus victrix, Acacia synchronicia*, lignum (*Duma*) and samphire shrublands and woodlands.

### Map Unit: 14



**Vegetation description:** Open woodland of *Eucalyptus victrix* and tall shrublands of *Acacia tetragonophylla, Acacia coricea* subsp. *pendans*, *Vachellia farnesiana, Acacia synchronicia,* over shrubs of *Duma florulenta*, *Eremophila spongiocarpa*, *Tecticornia indica* subsp. *bidens,* over grasses and herbs of *Paspalidium* aff. *jubiflorum* , *Cullen cinereum* and *Eragrostis dielsii* (Figure 29).

**Physical landform:** Flats on the margins of Fortescue Marsh where freshwater (derived from stony alluvial plains or drainage systems) drains onto the margin of the extensive saline flood plains.

**Soils:** Deep (>50 cm), red-brown silty loam or loamy sand with surface fragments of calcrete, BIF and associated metasediments.

**No plots: 6**

**No species/plot (2014 data only, n=6):** 44.2 ± 11.2 sp./plot

**No species/plot (total over 2013/2014, n=6):**44.2 ± 11.2 sp./plot

**Diagnostic taxa (SIMPER):** *Eragrostis dielsii, Eremophila spongiocarpa*, *Tecticornia indica* subsp. *bidens*, *Acacia synchronicia, Cullen cinereum, Eucalyptus victrix, Enchylaena tomentosa var. tomentosa, Paspalidium* aff. *jubiflorum, Cenchrus ciliaris*

**Most common perennial taxa (% frequency): trees-tall shrubs:** *Eucalyptus victrix* (50),, *Acacia coriacea* subsp. *pendens* (33), *Acacia sclerosperma* subsp. *sclerosperma* (33), *Acacia synchronicia* (100), *Acacia tetragonophylla* (67) **shrubs:** *Scaevola spinescens* (50), *Atriplex bunburyana* (50), *Eremophila spongiocarpa* (100), *Melaleuca glomerata* (50), *Senna* sp. Meekatharra (50), *Vachellia farnesiana* (50), *Atriplex amnicola* (33), *Duma florulenta* (67), **samphires**: *Tecticornia indica* subsp. *bidens* (83), *Tecticornia indica* subsp. *leiostachya* (50), *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) (33), **low shrubs:** *Atriplex flabelliformis* (33), *Solanum morrisonii* (67), *Enchylaena tomentosa* var. *tomentosa* (100), *Abutilon fraseri* subsp. *fraseri* (33), *Frankenia ambita* (50), *Neptunia dimorphantha* (50), *Einadia nutans* subsp. *eremaea* (67), *Solanum lasiophyllum* (33), *Sida fibulifera* (83), *Abutilon lepidum* (33), *Maireana triptera* (33), **herbs and grasses:** *Evolvulus alsinoides* var. *villosicalyx* (50), *Eragrostis xerophila* (33), *Panicum decompositum* (33), *Streptoglossa bubakii* (50), *Streptoglossa decurrens* (33), *Streptoglossa liatroides* (33), *Cullen cinereum* (100), *Enteropogon ramosus* (67), *Paspalidium* aff. *jubiflorum* (83), *Pluchea rubelliflora* (50), *Pterocaulon sphacelatum* (50), *Rhynchosia australis* (67), *Convolvulus clementii* (50), *Pluchea dunlopii* (33), *Cenchrus ciliaris* (83), *Cenchrus setiger* (33), *Bergia perennis* subsp. *obtusifolia* (33), *Eragrostis dielsii* (100), *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) (33)

**Conservation taxa (Priority Conservation Status):** *Atriplex flabelliformis* (3), *Eremophila spongiocarpa* (1), *Eremophila youngii* subsp. *lepidota* (4), *Nicotiana heterantha* (1), *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) (1), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (1).

**Notes:** This community is found on the edges of the Fortescue Marsh on alluvial substrates where freshwater water flows across the surface as sheetwash.

**Figure 29: Community Group IB:** Sparse tree mallee of *Eucalyptus victrix* over mid-dense shrubland of *Duma florulenta*, *Acacia synchronicia* and *Eremophila spongiocarpa* over mid-dense cover of *Sporobolus australasicus*and *Eragrostis xerophila* (survey site FORT037).

**Figure 30: Community Group JA:** Very sparse shrubland of *Eremophila youngii* subsp. *lepidota* over sparse shrubland of *Frankenia setosa*, *Maireana* spp. and *Sclerolaena* spp. over very sparse herbs and grasses (survey site FORT024).

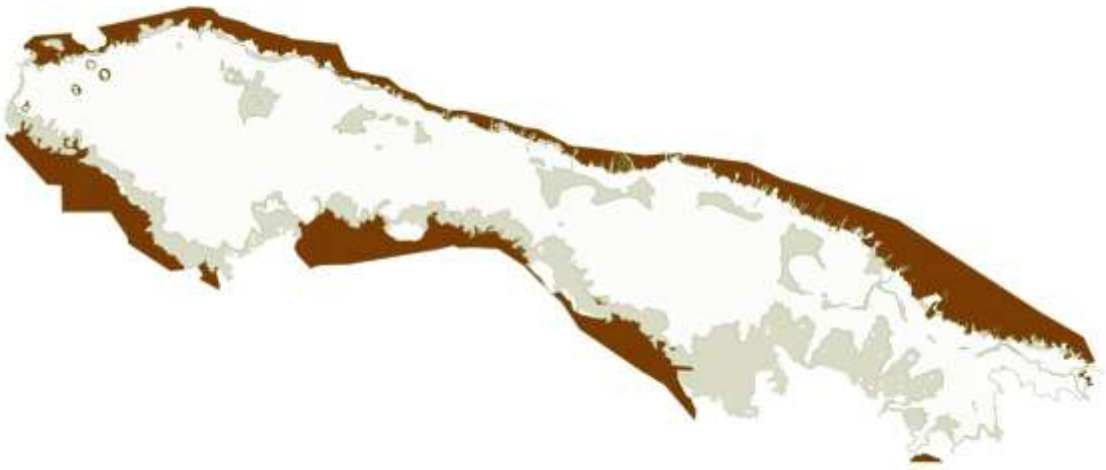
# Off-Marsh Land Systems (non-Marsh communities)

## Group J: *Acacia aptaneura* /*Eremophila youngii* shrublands on stony colluvial and alluvial plains.

## Group JA : *Acacia* shrublands over succulent chenopods on stony plains.

### Map Unit: 12 (non-Marsh colluvial shrublands)

Community JA is only part of a larger range of off-marsh communities which have been amalgamated into one map unit for convenience (non-Marsh colluvial shrublands).



**Vegetation description:** Very sparse trees of *Acacia aptaneura* and tall shrubs of *Acacia tetragonophylla* and *Eremophila youngii subsp. lepidota* over *Frankenia setosa, Maireana* spp. and *Sclerolaena* spp. and tussock grasses on stony plains (Figure 30).

**Physical landform:** Stony plains adjacent to the Fortescue Marsh extensive saline flood plain. Stony plains subject to sheet flow

**Soils:**.Shallow (5–50 cm), red-brown, loamy sand with mid-dense cover of surface fragments of BIF and other metasediments.

**No plots: 2**

**No species/plot (2014 data only, n=2):** 41.5 ± 6.4 sp./plot

**No species/plot (total over 2013/2014, n=2):** 41.5 ± 6.4 sp./plot

**Diagnostic taxa (SIMPER):** *Frankenia setosa, Eremophila youngii* subsp. *lepidota, Sclerolaena cuneata, Acacia tetragonophylla, Atriplex codonocarpa, Enchylaena tomentosa* var. *tomentosa, Enteropogon ramosus, Eragrostis dielsii, Eragrostis setifolia*

**Common perennial taxa (% frequency): trees-tall shrubs-shrubs:** *Acacia aptaneura* (50), *Acacia tetragonophylla* (100), *Eremophila youngii* subsp. *lepidota* (100), *Eremophila forrestii* subsp. forrestii (50), *Eremophila cuneifolia* (50), *Senna artemesioides* subsp. *helmsii* × *oligophylla* (50), *Enchylaena tomentosa* var. *tomentosa* (100), *Atriplex bunburyana* (50), *Eremophila spongiocarpa* (100), *Senna artemisioides* subsp. *helmsii* (50), *Senna artemisioides* subsp. *oligophylla* (50), *Rhagodia eremaea* (100), *Ptilotus obovatus* (50), **low shrubs:** *Solanum lasiophyllum* (50), *Sida fibulifera* (50), *Sclerolaena densiflora* (100), *Sclerolaena cuneata* (100), *Frankenia setosa* (100), *Sclerolaena eriacantha* (50), *Maireana eriosphaera* (100), *Maireana carnosa* (100), *Maireana integra* (50), *Lepidium platypetalum* (50), *Maireana pyramidata* (100), *Sclerolaena lanicuspis* (50), *Maireana platycarpa* (50), *Abutilon cryptopetalum* (50), **herbs and grasses:** *Eragrostis setifolia* (100), *Indigofera linnaei* (50), *Evolvulus alsinoides* var. *villosicalyx* (50), *Eragrostis xerophila* (50), *Xerochloa barbata* (100), *Atriplex codonocarpa* (100), *Trianthema turgidifolium* (50), *Streptoglossa odora* (50), *Streptoglossa bubakii* (50), *Enteropogon ramosus* (100), *Cenchrus ciliaris* (50), *Eragrostis dielsii* (100)

**Conservation taxa (Priority Conservation Status):** *Eragrostis crateriformis* (3), *Eremophila spongiocarpa* (1), *Eremophila youngii* subsp. *lepidota* (4),

**Notes** Only two sites were sampled although this is a more extensive and diverse community on stony plains along the northern and southern boundary of the Marsh, since these sites are outside the boundary of the Fortescue Marsh. This vegetation occurs on colluvial and alluvial deposits derived from Chichester Ranges, and on stony colluvium on southern edge of the Marsh associated with the Hamersley Ranges. Further survey is required to identify communities associated with the extensive *Acacia aptaneura* and *Acacia xiphophylla* woodlands of the neighbouring Cowra, Warrri, Marillana and Christmas Land Systems.

## Addition vegetation associations not sampled but included in Map Unit 12.

### *Acacia aptaneura* woodlands over *Paspalidium* sp. and *Eragrostis cumingii* grassland.

Patches of aeolian woodlands are common along the northern boundary of the Fortescue Marsh. These are stands of tall *Acacia aptaneura, Acacia synchronicia* and/or *Acacia tetragonophylla,* over a dense understory dominated by tall grasses *(Eragrostis cumingii, Cenchrus ciliaris*, *Paspalidium* aff. *jubiflorum*) and sparse shrubs *(Eremophila maculata* subsp. *brevifolia, Eremophila spongiocpara, Eremophila forrestii, Tecticornia indica* subsp. *bidens).* These sites would be worth further sampling to determine if these are a discrete Marsh-edge community distinguishable from the Mulga woodlands on the colluvial/alluvial plains.

### *Acacia aptaneura* woodlands over *Senna* spp. and *Eremophila* spp. shrubland.

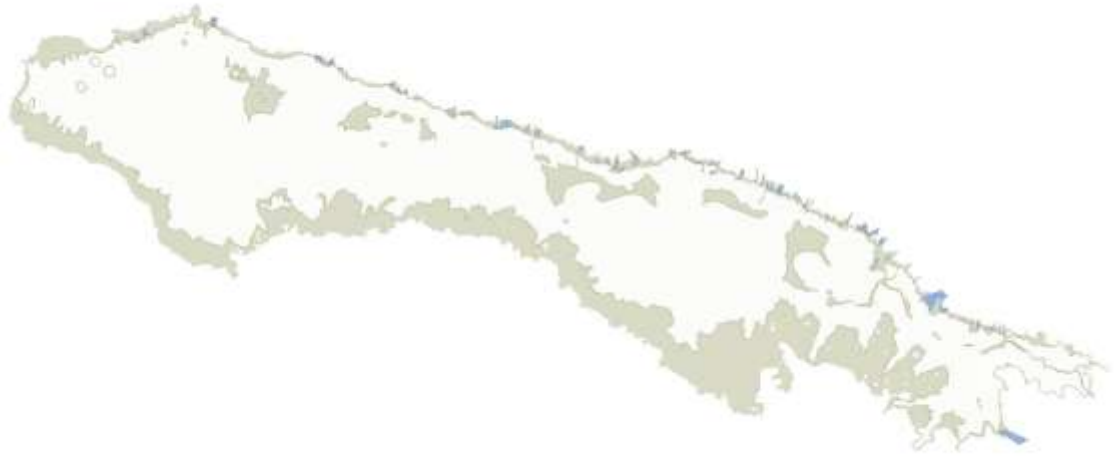
Belts of Mulga woodlands are common on the northern and southern stony plains bordering the Fortescue Marsh. These are distinctly non-Marsh communities and have been included in Map Unit 12. These Mulga woodlands of tall *Acacia aptaneura,* includes tall shrubs of *Hakea lorea, Acacia tetragonophylla,* over sparse shrubs *(Eremophila latrobei, Eremophila lanceolata, Eremophila labtrobei, Senna artemisioides* subsp. *helmsii*) over herbs and grasses (including *Aristida contorta, Goodenia prostrata, Sclerolaena cornishiana).* These sites would be worth further sampling to determine if these are a discrete Marsh-edge community distinguishable from the Mulga woodlands on the colluvial/alluvial plains.

### *Acacia xiphophyllalAcacia aptaneura* woodland over chenopods on stony colluvium.

Low open woodlands dominated by Snakewood (*Acacia xiphophylla*), with *Acacia aptaneura* and *Acacia tetragonophylla*, over scattered low shrubs (including *Maireana georgei, Maireana carnosa, Frankenia setosa, Trianthema turgidifolium*, *Sclerolaena cuneata*). These low, open woodlands are common on the stony colluvial plains surrounding the Fortescue Marsh, and are mostly likely either closely allied to or are Community Group JA.

## Group JB : Alluvial *Acacia synchronicial*saltbush shrublands.

### Map Unit: 13



**Vegetation description:** Sparse open shrubland or isolated shrubs of *Acacia synchronicia* over *Atriplex bunburyana, Maireana pyramidata* and *Eremophila spongiopcarpa,* over low shrubs of *Maireana* spp. *Sclerolaena* spp. *and Lepidium platypetalum*. Sometimes with an overstorey of *Acacia aptaneura*, *Acacia tetragonophylla* or *Melaleuca xerophila* trees or tall shrubs (Figure 31).

**Physical landform:** Ephemeral creeklines and drainage channels traversing through stony plains to drain into the Fortescue Marsh. Located primarily along northern boundary of the Fortescue Marsh.

**Soils**: Shallow (5–50 cm) to deep (>50 cm), red-brown loam with mid-dense cover of surface fragments of BIF & associated metasediments.

**No plots: 3**

**No species/plot (2014 data only, n=3):** 35.0 ± 8.2 sp./plot

**No species/plot (total over 2013/2014, n=3):** 35.0 ± 8.2 sp./plot

**Diagnostic taxa (SIMPER):** *Atriplex bunburyana*, *Acacia synchronicia, Eragrostis dielsii, Cenchrus ciliaris, Eremophila spongiocarpa, Lepidium platypetalum, Enchylaena tomentosa* var. *tomentosa* and *Enteropogon ramosus.*

**Common perennial taxa (% frequency): tall shrubs - shrubs:** *Melaleuca glomerata* (33), *Acacia tetragonophylla* (67), *Vachellia farnesiana* (33), *Senna* sp. Meekatharra (33), *Atriplex bunburyana* (100), *Acacia synchronicia* (100), *Acacia coriacea* subsp. *pendens* (33), *Senna glutinosa* subsp. *glutinosa* (33), *Eremophila latrobei* subsp. *filiformis* (33), *Senna artemisioides* subsp. *oligophylla* (67), *Rhagodia eremaea* (33), *Senna artemisioides* subsp. *helmsii* (33), *Eremophila youngii* subsp. *lepidota* (67), *Eremophila forrestii* subsp. forrestii (67), **samphires**: *Tecticornia indica* subsp. *bidens* (67), **subshrubs:** *Aerva javanica* (33), *Lepidium platypetalum* (67), *Sclerolaena diacantha* (100), *Maireana pyramidata* (100), *Enchylaena tomentosa* var. *tomentosa* (100), *Maireana amoena* (33), *Sida fibulifera* (67), *Maireana platycarpa* (33), *Sclerolaena cuneata* (100), *Frankenia setosa* (33), *Sarcostemma viminale* subsp. *australe* (33), *Maireana carnosa* (67), *Maireana integra* (33), *Atriplex codonocarpa* (67), *Sclerolaena densiflora* (67), *Abutilon lepidum* (33), *Maireana triptera* (67), *Ptilotus obovatus* (33), **herbs and grasses:** *Eragrostis xerophila* (33), *Pluchea ferdinandi-muelleri* (33), *Panicum decompositum* (33), *Trianthema turgidifolium* (33), *Enneapogon polyphyllus* (33), *Goodenia forrestii* (33), *Streptoglossa bubakii* (33), *Enteropogon ramosus* (100), *Paspalidium* aff. *jubiflorum* (67), *Pluchea dunlopii* (33), *Cenchrus ciliaris* (100), *Triodia longiceps* (67), *Cenchrus setiger* (33), *Eremophila spongiocarpa* (67), *Eragrostis dielsii* (100),

**Conservation taxa (Priority Conservation Status):** *Eremophila spongiocarpa* (1), *Eremophila youngii* subsp. *lepidota* (4)

**Notes:** This community occurs mainly on the adjacent colluvium and extends to the Marsh edge and beyond this boundary for usually a short distance before giving way to a samphire community.

**Figure 31: Community Group JB**: Sparse shrubland of *Acacia synchronicia* and *Eremophila youngii* over sparse shrubland of *Atriplex bunburyana*, *Acacia synchronicia*, *Maireana pyramidata*, over mid-dense subshrubs, forbs and grasses of *Maireana platycarpa*, *Lepidium platypetalum* and *Sclerolaena diacantha* (survey site FORT081).

**Figure 32: Community Group K**: *Triodia longifolia* hummock grasslands and *Melaleuca glomerata* shrublands on calcrete plain (survey site FORT011).

## Group K: *Triodia* hummock grasslands or *Acacia* shrublands/*Triodia* grasslands.

### Map Units: 3 (*Triodia* on calcrete and colluvium) and 4 (red sand dunes)

**Vegetation description:** *Triodia epactia* or *Triodia longifolia* hummock grasslands or *Melaleuca glomerata, Acacia bivenosa, Acacia sclerosperma* and/or *Acacia tetragonophylla* shrublands over *Triodia* hummock grasslands. *Triodia angusta*-dominated hummock grasslands were identified on the far southwest boundary of the Fortescue Marsh (Figures 32 & 33).

**Physical landform:** On extensive, flat calcrete plains with exposed calcrete bedrock. Extensive *Triodia* grasslands predominate along the southern perimeter of the Fortescue Marsh and the Calcrete Land System, but these *Triodia* grasslands are also found as a narrow strip along the northern margin.

Also on deep red sand dune deposits overlying calcrete on the Marsh Land System edge - notably in the south-east of the Fortescue Marsh.

**Diagnostic taxa (SIMPER):** *Triodia longiceps, Melaleuca glomerata, Cenchrus ciliaris, Enchylaena tomentosa* var. *tomentosa, Scaevola spinescens, Corchorus sidoides* subsp. *sidoides, Rhagodia eremaea, Eragrostis eriopoda, Enneapogon polyphyllus*

**Soils:** Shallow (5–50 cm) or skeletal (<5 cm), gravelly-rocky, alkaline, calcareous shallow pale-brown to red-brown, sandy loams, or deep (> 50 cm), red, sandy soils.

**No plots: 6**

**No species/plot (2014 data only, n=6): 35.7** ± 9.4 sp./plot

**No species/plot (total over 2013/2014, n=6):** 35.7 ± 9.4 sp./plot

**Common perennial taxa (% frequency): tall shrubs – shrubs:** *Melaleuca glomerata* (83), *Enchylaena tomentosa* var. *tomentosa* (83), *Scaevola spinescens* (83), *Rhagodia eremaea* (83), *Acacia tetragonophylla* (50), *Eremophila longifolia* (67), *Acacia sclerosperma* subsp. *sclerosperma* (50), *Acacia synchronicia* (50), *Acacia bivenosa* × *sclerosperma* (50), *Eremophila forrestii* subsp. *forrestii* (33), *Senna artemisioides* subsp. *helmsii* × *oligophylla* (33) **low shrubs:** *Corchorus sidoides* subsp. *sidoides* (83), *Ptilotus obovatus* (67), *Hibiscus sturtii* var. *campylochlamys* (50), *Sida fibulifera* (50), *Abutilon otocarpum* (50), *Indigofera monophylla* (50), *Hibiscus brachychlaenus* (50), *Hibiscus sturtii* var. *platychlamys* (33), *Maireana triptera* (33), *Heliotropium chrysocarpum* (33), *Solanum morrisonii* (33), *Abutilon lepidum* (33), *Melhania oblongifolia* (33), *Pluchea ferdinandi-muelleri* (33), *Sida arsiniata* (33), **herbs and grasses:** *Triodia longiceps* (83), *Triodia epactia* (33), *Stemodia grossa* (33), *Trichodesma zeylanicum* var. *zeylanicum* (33), *Paraneurachne muelleri* (50), *Eragrostis eriopoda* (67), *Ptilotus astrolasius* (33), *Solanum lasiophyllum* (50), *Enneapogon polyphyllus* (67), *Goodenia forrestii* (50), *Pterocaulon sphacelatum* (33), *Rhynchosia australis* (67), *Cenchrus ciliaris* (100), *Eragrostis dielsii* (33)

**Conservation taxa (Priority Conservation Status):** *Eucalyptus rowleyi* (3), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) (1)

**Notes**: This community was under-sampled as it was not a Marsh Land System unit, but sites were included owing to their proximity to the Fortescue Marsh. Increased sampling over the extent of the landforms would identify further complexity within this broad community unit.

Low red sand dunes on the Fortescue Marsh were observed to support a small subset of taxa from this community, mainly *Melaleuca glomerata* shrublands over *Triodia* spp., *Cenchrus ciliaris, Chenopodium gaudichaudianum* and *Eragrostis eriopoda*. These species eventually give way to a Group E community on the lowest sand mounds.

The aerial imagery suggests that *Eucalyptus* (possibly *E. victrix*) appears as an overstory to *Triodia* grasslands on calcrete bordering the extreme south-eastern part of the Fortescue Marsh. These areas have yet to be surveyed.

Within the interior of the extensive Calcrete Land System are many small samphire shrublands located in a multitude of clay-filled depressions on the calcrete plain which support samphire shrublands dominated by *Tecticornia indica* subsp. *bidens* and *Eremophila spongiocarpa* (Figure 34). These are located well outside of the Fortescue Marsh boundary and therefore are excluded from the Marsh Land System, but do have some affinities to Marsh samphire Group C communities (see Units 205/206 description below).

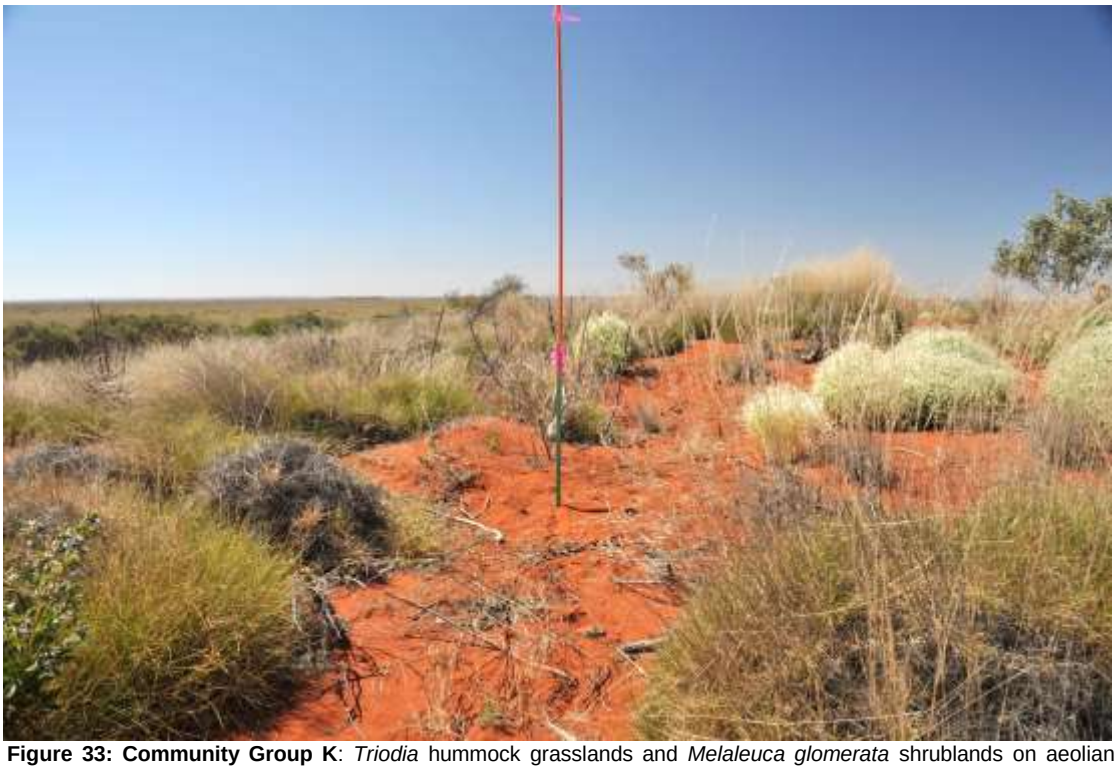


**Figure 33: Community Group K**: *Triodia* hummock grasslands and *Melaleuca glomerata* shrublands on aeolian red sand dunes (survey site FORT032).

**Figure 34:** Unclassified *Tecticornia indica* subsp. *bidens* and *Eremophila spongiocarpa* samphire shrublands in clay-filled depressions on the extensive calcrete plain south of Fortescue Marsh.

# Gypsum outcrops

## Group L: Gypsum outcrop shrubland community.

**Map Unit: 7**

**Vegetation description:** The upperslopes and crests support a very sparse shrubland or isolated shrubs of *Acacia sclerosperma* subsp. *sclerosperma, Santalum lanceolatum, Maireana pyramidata*, *Senna artemisioides* subsp. *helmsii* and *Rhagodia eremaea* over a low, sparse shrubland of *Scaevola collaris, Enneapogon caerulescens, Eragrostis dielsii* and *Cenchrus ciliaris* (Figure 35).

The surrounding flats are dominated by a sparse low shrubland of *Lawrencia helmsii*, *Scaevola collaris, Neobassia astrocar*pa and *Frankenia ambita*.

**Physical landform**: Crests and flats of low (3–5 m) gypsum outcrops and deposits located in the centre of and extensive saline floodplain.

**Soils:** Skeletal-shallow**,** gravelly-rocky, alkaline, calcareous, loamy-sands with areas of exposed gypsum bedrock.

**No plots: 4**

**No species/plot (2014 data only, n=4):** 14.5 ± 3.1 sp./plot

**No species/plot (total over 2013/2014, n=4):** 14.5 ± 3.1 sp./plot

**Diagnostic taxa (SIMPER):** *Scaevola collaris, Neobassia astrocarpa, Eragrostis dielsii*, *Cenchrus ciliaris*

**Common perennial taxa (% frequency): Tall shrubs:** *Acacia sclerosperma* subsp. *sclerosperma* (50), , *Melaleuca glomerata* (25), **shrubs and samphires:** *Santalum lanceolatum* (25), *Enchylaena tomentosa* var. *tomentosa* (25), *Senna glaucifolia* (25), *Rhagodia eremaea* (50), *Atriplex bunburyana* (25), *Maireana pyramidata* (75), *Senna artemisioides* subsp. *helmsii* (50), *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) (50) **low shrubs:** *Frankenia ambita* (50), *Maireana luehmannii* (25), *Swainsona unifoliolata* (25), *Scaevola collaris* (100), *Lawrencia helmsii* (50), *Neobassia astrocarpa* (100), *Aerva javanica* (50), **herbs and grasses:** *Eragrostis desertorum* (25), *Atriplex codonocarpa* (25), *Enneapogon caerulescens* (50), *Cenchrus ciliaris* (100), *Eragrostis dielsii* (100)

**Conservation taxa (Priority Conservation Status): -** none located

**Notes:** This distinctive community is associated with small, low, rocky outcrops of gypsum in southern central interior of the Fortescue Marsh. These outcrops are surface expression of otherwise more extensive deposits of gypsum which are covered in sediments (sometimes shallowly). No kopi dunes (fine gypseous sand deposits) mentioned by Payne 2004 were located on the Marsh in this survey.

This community appears to be particularly adversely affected by Buffel Grass (*Cenchrus ciliaris*) and rabbits, as well as a site for *Aerva javanica*.

Given their close association with gypsum deposits on the Marsh, several taxa (*Lawrencia helmsii*, *Scaevola collaris, Neobassia astrocarpa, Zygophyllum compressum* and *Swainsona unifoliolata*) appear to be gypsophilous taxa.

**Figure 35: Community Group L**: Isolated tall shrubs of *Acacia sclerosperma* and *Santalum lanceolatum* over *Maireana pyrimidata*, *Senna* sp. Meekatharra (E. Bailey 1-26), *Senna artemisioides* subsp. *helmsii* and *Rhagodia eremaea*, over *Scaevola collaris*, *Enneapogon caerulescens*, *Eragrostis dielsii* and *Cenchrus ciliaris* (adjacent to survey site FORT112).

# Unclassified Communities

**Mulga and *Acacia pyrifolia* over *Triodia* hummock grassland on hills of siliceous breccia (non-samphire).**

**Map Unit 1:**

Isolated trees of *Acacia aptaneura* and shrubs of *Acacia pyrifolia* over *Triodia* hummock grassland on low hills of siliceous breccia caprock. Located on the rocky slopes of the Goodiadarrie Hills and isolated hillocks in the western section of the Fortescue Marsh. Corresponds to Adrian Land System of Payne (2004).

**Southern Weeli Wolli Fan alluvial/colluvial *Eucalyptus victrix*, *Eucalyptus camaldulensis* and Mulga mosaic woodlands.**

**Map Unit 8:**

This alluvial and riparian unit is associated with the Weeli Wolli drainage flowing into the Fortescue Marsh. Although not visited, aerial and photopoint imagery suggests a mosaic of *Eucalyptus* and Mulga woodlands. Woodlands of *E. camaldulensis, E. victrix* and *Acacia aptaneura/A. paraneura* over *Acacia synchronicia*, *Acacia tetragonophylla* and *Atalaya hemiglauca*, over a dense grass layer, including *Cenchrus ciliaris*. Corresponds to Fortescue Land System of Payne (2004).

**Sparse *Acacia aptaneura* or *Eragrostis dielsii* & *Enneapogon* sp. tussock grassland calcrete.**

**Map Unit 9:**

Grasslands of *Eragrostis dielsii*, *Enneapogon caerulescens* and/or *Cenchrus ciliaris* with scattered trees or small stands of *Acacia aptaneura, Melaleuca glomerata*, *Acacia xiphophylla* and *Acacia tetragonophylla* over scattered shrubs of *Senna artemisioides* subsp. *helmsii*, *Eremophila forrestii, Solanum lasiophyllum* and *Ptilotus obovatus*.

This vegetation association occurs on parts of the calcrete plains abutting the Fortescue Marsh in lieu of *Triodia* hummock grasslands. These areas support either tussock grasslands or shrublands of *Acacia tetragonophylla, Acacia synchronicia, Acacia xiphophylla* and/or *Melaleuca glomerata*, over shrubs (including *Senna artemisioides* ssp. *helmsii*, *Scaevola spinescens*, *Eremophila youngii* ssp. *lepidota* and *Ptilotus obovatus*), over mid-dense grassland of *Cenchrus ciliaris* and other tussock grasses.

**Snakewood over buffel on red sand dunes, sandy soil and claypan mosaic.**

**Map Unit 18:**

Along the southern edge of the Fortescue Marsh, covering a relatively small area overall, are deposits of red sands, sandy clays on flats and forming small dunes. These support grasslands dominated by *Cenchrus ciliaris*, or low open *Acacia xiphophylla* woodlands over *Eremophila spongiocarpa, Atriplex bunburyana, Tecticornia indica* and *Cenchris ciliaris*. This area also has numerous claypans, around which are sparse shrublands of *Eremophila spongiocarpa, Atriplex bunburyana* and *Tecticornia indica.*

**Weeli Wolli creekline alluvial *Triodia*, *Acacia* and samphire mosaic.**

**Map Unit 201:**

The Weeli Wolli creek eventually discharges into the Fortescue Marsh, and the vegetation associated with this meandering channel through an alluvial floodplain and alluvial outwash onto the Fortescue Marsh, was mapped as a single unit distinct from the surrounding areas. Because this area was not accessed/inaccessible, there is great deal of uncertainty as to the exact vegetation in this map unit. From aerial imagery, this vegetation appears to be *Acacia* shrublands (*A. aptaneura* and *A. synchronicia*) and *Cenchrus ciliaris* grassland on rises and depressions associated with deposits of alluvium from Weeli Wolli creek inflow. An area immediately south of this unit has been mapped as *Acacia aneura* woodlands over *Acacia synchronicia* and *Cenchrus ciliaris* (Ecologia Environment 2009b). This Map Unit is equivalent to the Fortescue Land System of Payne (2004), which documents shrublands of *Acacia citrinoviridis* and *Acacia aneura* (s.l.) over scattered and tussocks grasses (mostly *Chrysopogon fallax* and *Cenchrus ciliaris*) on alluvial landforms.

Further onto the Fortescue Marsh, grasses give way to a shrubland community possibly allied to Group IB (similar perhaps to plot FORT105, Appendix 1) and then samphire shrublands (possibly similar to Group E). As this area is associated with substantial alluvial and freshwater inputs, it may have vegetation communities not found elsewhere on the Fortescue Marsh. Further survey is required to verify this and identify floristic communities present.

## Roy Hill alluvial *Eucalyptus* woodlands.

**Map Unit 202:**

This single map unit covers the vegetation associated with alluvial floodplains east of the headwaters of the Fortescue Marsh and immediately north of Roy Hill, where the Upper Fortescue River winds through alluvial flats before entering the Fortescue Marsh. These alluvial plains support seasonally filled claypans, *Eucalyptus victrix* woodlands, *Acacia aptaneura* woodlands and *Eucalyptus camaldulensis* riparian vegetation along major watercourses. The understory often contains *Acacia synchronicia*, mixed low shrubs and various tussock grasses. This community was described by Payne & Mitchell (1999) as part of their Fortescue Land System description (Unit 2).

*Eucalyptus victrix* woodland over *Acacia coriacea, Acacia aptaneura*, over mixed shrubs and tussock grasses.

*Eucalyptus* and *Acacia* woodland floodplain vegetation east of the Fortescue Marsh, as seen from Roy Hill (looking southwest).

## 204: *Melaleuca* and Mulga on calcrete ridges.

**Map Unit 8:**

Along the northern edge of the Fortescue Marsh are small, low calcrete ridges which support stands of *Melaleuca glomerata* and *Acacia aptaneura* over *Acacia synchronicia, Acacia ampliceps, Acacia tetragonophylla, Atriplex bunburyana* and other low shrubs. This community is allied to Group JA.

These ridges are relatively small features and surrounded by samphire shrubland communities. *Aerva javanica* was a commonly observed weed on these calcrete ridges.

**205 and 206: Unknown grassy (*Paspalidium* aff. *jubiflorum*) samphire shrubland allied to Group C.**

Outside of the Fortescue Marsh Land System boundary on the Calcrete Land System are samphire shrublands which have floristic affinities to Group C. These were not sampled as they were not considered part of the Fortescue Marsh communities owing to their distance and disjunction from the Marsh.

These areas do become inundated or wet during (albeit infrequently during the more extreme flood events). Photopoints indicate that these are *Tecticornia indica* subsp. *bidens*, *Eremophila spongiocarpa* and *Paspalidium* aff. *jubiflorum* grassy samphire communities.

Further survey will determine floristic affinities to Marsh communities.

**207: Unsurveyed alluvial samphire: eastern Marsh.**

This unit maps a part of the Fortescue Marsh samphires which were unable to be surveyed so its composition is unknown, but it is suspected that this is a low samphire community allied to Group E.

**208: Upper Fortescue riparian *Eucalyptus victrix*/*Eucalyptus camaldulensis* woodlands.**

This is a narrow riparian community which lines the Upper Fortescue River on the alluvial plains, consisting of *Eucalyptus victrix* and *E. camaldulensis* woodlands over *Melaleuca glomerata, Acacia coriacea* subsp. *pendans*, over low shrubs and a grassy understory. This community was described by Payne & Mitchell (1999) as part of their Fortescue Land System description (Unit 7). The point where Group G transitions to this riparian community hasn't been located, but presumably it would occur east of where the river forms semi-permanent/permanent freshwater pools.

## 3.3 Vegetation Mapping

The boundary of the Fortescue Marsh Land System was designated as the outer edge of the samphire dominated shrublands, this often being the outer limit of Community Group C. This new Marsh Land System boundary did not deviate greatly from the original boundary (Figure 36), but was expanded to follow the distinct outer samphire edge with greater accuracy (i.e. maximum flood extent). Difficulties were encountered along the Calcrete-Marsh Land System boundary when the edge became indiscernible due to presence of Calcrete samphire claypan communities, where woodlands abutted the Marsh Community Group IB, and where ephemeral creeks and rivers fed into the Marsh. This was particularly evident where Weeli Wolli creek flowed into the Marsh. In these cases, referring to the maximum extent of inundation helped delineate the boundary. The Fortescue Land System boundary does not match the 410 m ASL contour.

A vegetation map was produced of the vegetation communities identified in the classification analysis (overview in Figure 37, Appendix 4). Digital aerial imagery, particularly the June 2015 orthoimages, provided enough fine-scale detail to discern vegetation zonation, vegetation structure, individual trees and shrubs, and even the species of dominant trees, shrubs and samphires. Such fine detail, improved with contrast enhancement, was crucial for mapping vegetation communities. Aerial photographs were manually interpreted to draw polygons over areas of vegetation with similar properties (i.e. vegetation communities), and these were based primarily on vegetation that could be identified in orthoimages. This required heavy reference to plots, photopoints, previously compiled datasets (ENV Australia Pty Ltd 2009, Mattiske Consulting 2005, 2007) and an intimate knowledge of the Fortescue Marsh vegetation gained from fieldwork. Dominant species and vegetation communities were identified by their colour, tone, shape, size, shadows (which distinguished taller shrubs and trees), site, geology, landform texture, landscape position and landscape context (such as proximity to calcrete plains or river channels) (Morgan *et al.* 2010). Examples of aerial photograph interpretation are given in Figures 38 and 39. Additional information was gained from comparing aerial images of the same sites taken over four different years, and comparing colour-infrared versus colour images (the former which was useful for discerning *Muellerolimon salicorniaceum*) (Figure 40).

As was noted in the previous section describing the vegetation communities, several Vegetation Community Groups were combined at a higher level into a single mapping unit since they could not be resolved at a finer detail on the aerial imagery and were more informative combined at a higher level. These communities are Group C (CA and CB), Group E (EA, EB and EC) and Group F (FA and FB). Despite this, difficulties were encountered in interpretation, particularly in areas for which there was no site information. This was particularly so for discerning Community Group BB and Group E (especially for stands dominated by *Tecticornia auriculata*), and resolving the boundaries for Groups C, DA and F.

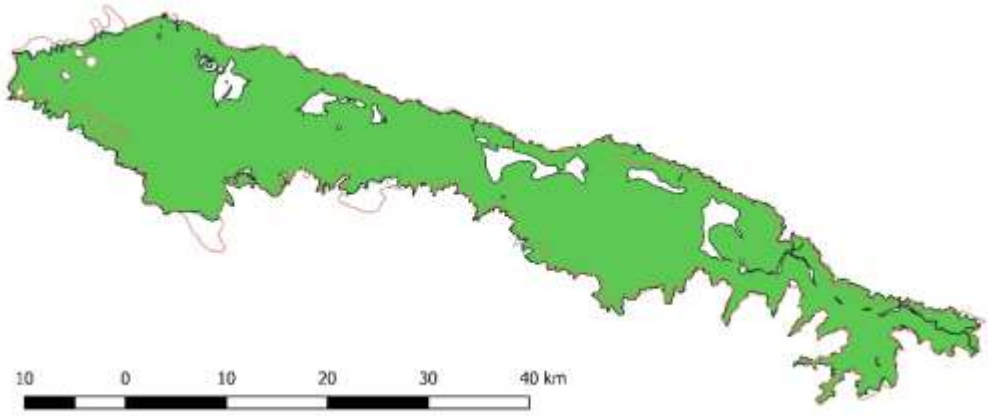



**Figure 36:** Updated Fortescue Marsh Land System boundary (solid green polygon) – redrawn to encompass the outer boundary of samphire-dominated shrublands. The old Marsh Land System boundary (from van Vreeswyk *et al.* 2004), is outlined in red. Bare lake beds, river channels and hills within the Marsh boundary have been excluded from the polygon area. Note: the area where Weeli Wolli alluvial drainage flows into the Marsh requires further ground-truthing and survey to delineate where the Marsh margin occurs in that area.

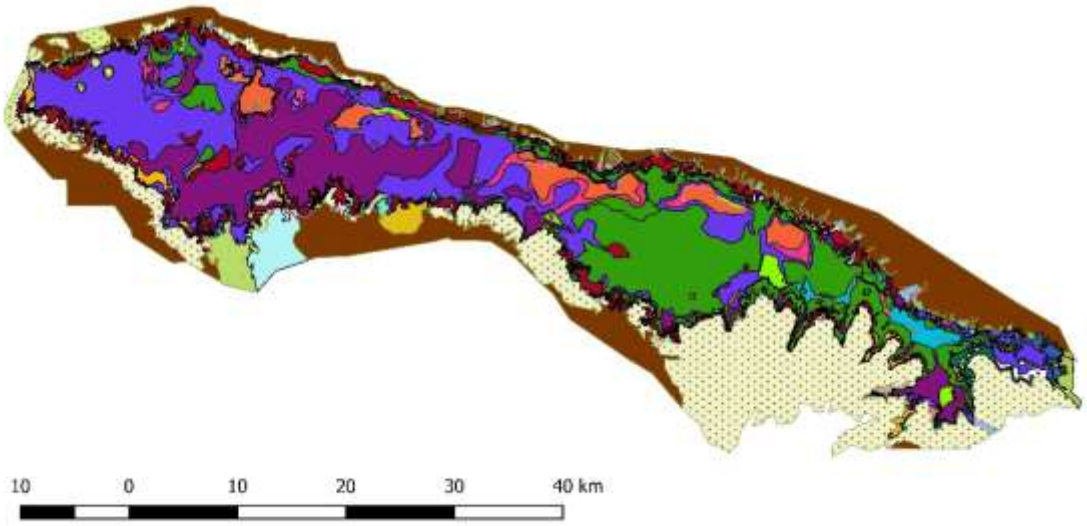



**Figure 37:** Overview image of the Vegetation Map of the Fortescue Marsh, generated from interpretation of digital aerial imagery and manually drawing polygons. Detailed imagery are presented in Appendix 4.


**Figure 38:** Detail of digital aerial imagery of the Fortescue Marsh with reference vegetation plots for Community Group C (FORT014) and Community Group F (FORT013).

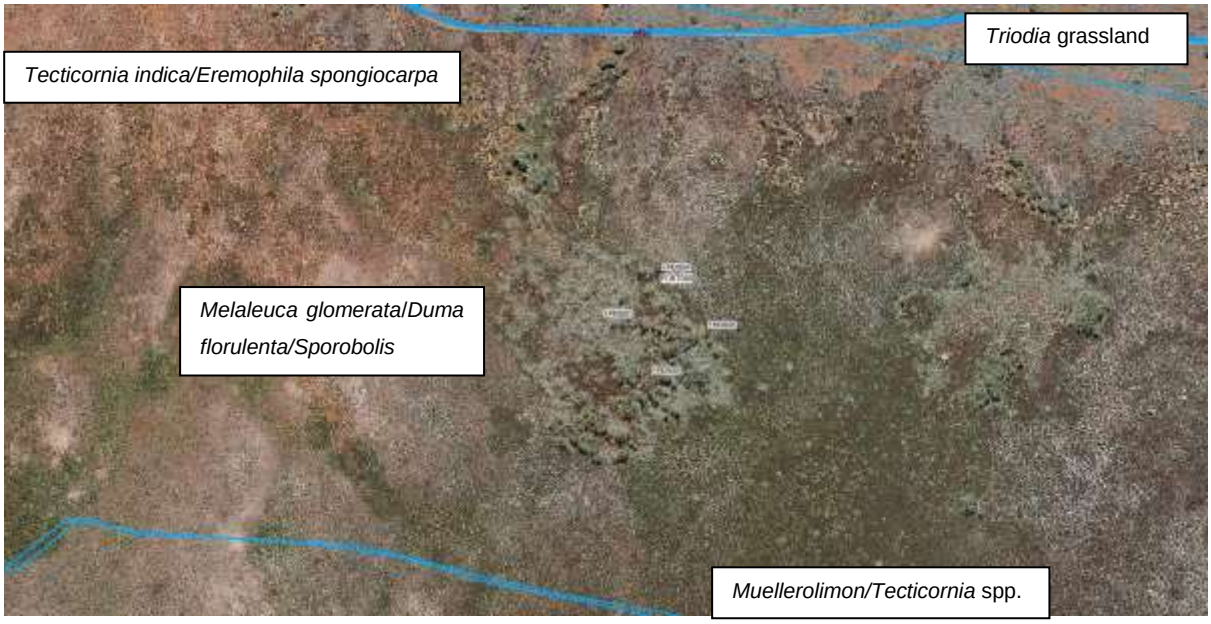



**Figure 39:** Detail of digital aerial imagery of the Fortescue Marsh with reference vegetation plots for Community Group IA (FORT080) – a stand of *Melelauca glomerata* over lignum and patches of *Sporobolis mitchellii* grassland among samphire shrublands.

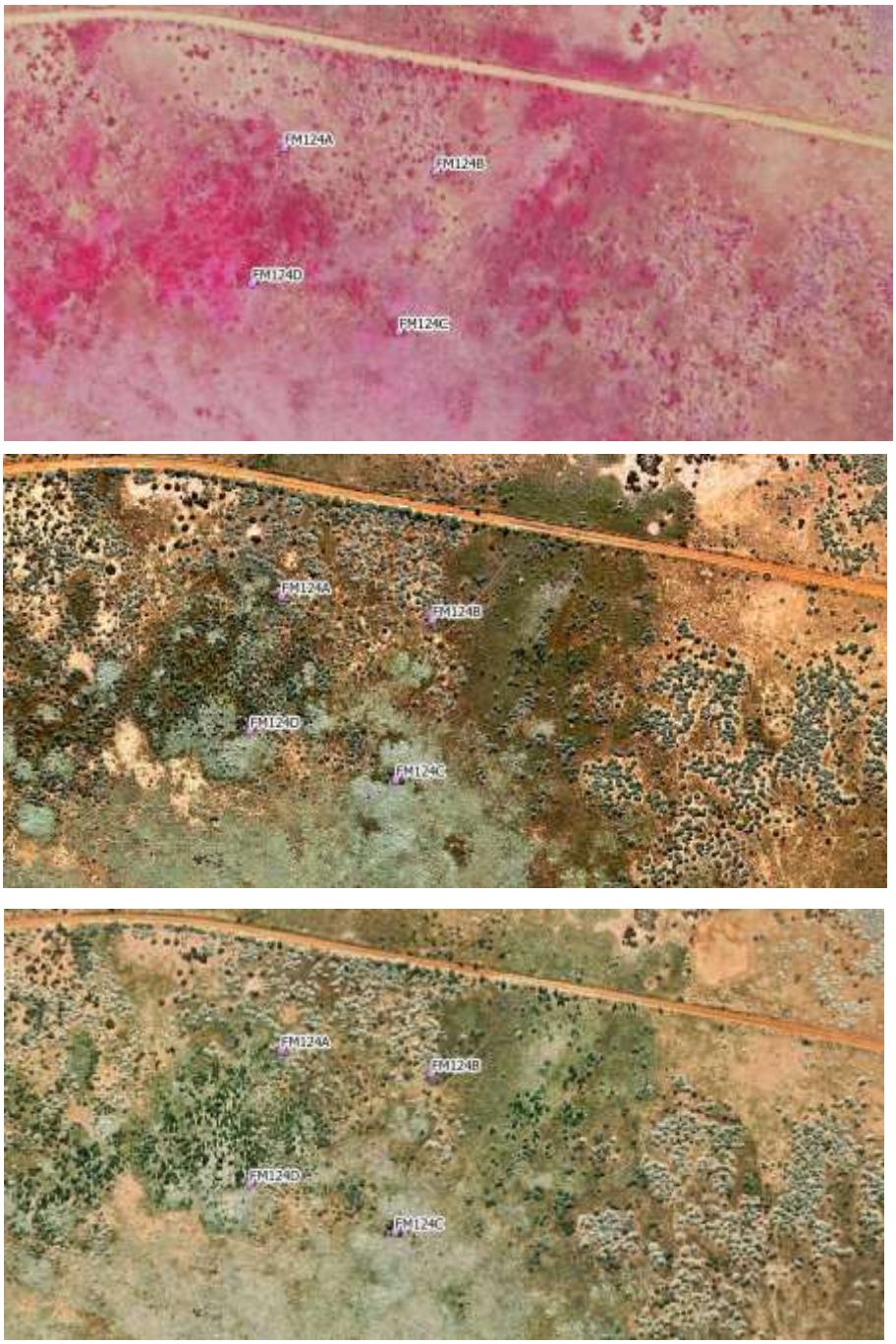



**Figure 40:** Comparison of orthoimages of Fortescue Marsh vegetation. Top: April 2012 colour-infrared (CIR). Middle: June 2015 colour (RGB). Bottom: June 2014 colour (RGB). These three images of the same site shows Community Group IA, with *Duma florulenta* over *Sporobolis mitchellii* grassland. The CIR orthoimage shows areas of grasslands responding to subsurface freshwater (pink areas). Indistinguishable in the June 2015 orthoimages, *Duma florulenta* becomes distinguishable from *Triodia longiceps* in the June 2014 orthoimage as dark green shrubs relative to pale white hummocks, and as dark pink shrubs in the April 2012 orthoimage.

# 4. Discussion

## 4.1 Flora

In terms of taxonomic composition (dominant families and genera), the flora of the Fortescue Marsh is typical for the Eremaean and Pilbara region (Beard 1975, Beard1990, (van Vreeswyk 2004), and for arid-zone freshwater and saline wetlands in Western Australia (DEC 2012). Not unsurprisingly, the proportion of chenopod taxa (13%) were double the proportion occurring in the Pilbara region flora (5%) (S. Dillon, unpublished data), reflecting the focus on saline flood plain flora. The diversity of wetland habitats also mean that species characteristic of freshwater wetlands (i.e. *Duma florulenta, Eucalyptus victrix, Eucalyptus camaldulensis, Typha domingensis, Cyperus* spp.) were also present.

A total of 352 taxa were recorded in this survey across the entire Fortescue Marsh, compared to 196 taxa (ENV Australia Pty Ltd 2013) and 230 taxa (ENV Australia Pty Ltd 2011) recorded by environmental surveys from smaller areas of the Marsh. This increase in survey effort resulted in 18 species as new records or range extensions for the Marsh. Fourteen taxa of conservation significance were located, four of these new records for the Marsh (two were identified as new taxa and listed with priority conservation status). Six of these were endemic or near-endemic taxa for the Fortescue Marsh, which emphasises the conservation significance of this arid-zone wetland complex. The annual/short-term perennial conservation-listed species, *Calotis squamigera, Nicotiana heterantha, Eleocharis papillosa* and *Atriplex flabelliformis*, were found to be highly seasonally variable in presence, being absent or reduced in abundance and distribution between years. This marked seasonal variability in taxa which track rainfall events is important to consider for targeted surveys for threatened and rare flora in arid zone wetlands.

Several priority species known from the Fortescue Marsh area were not located during this survey. For some (*Lepidium catapycnon*, *Teucrium pilbaranum* and *Stackhousia clementii),* these taxa are known to be located close to the Marsh but still occur outside of the Marsh boundary in alluvial/colluvial substrates. Other conservation-listed taxa were possibly present but easily overlooked during this general flora and vegetation survey.

Range extensions for the Fortescue Marsh included five species which grew in close association with gypsum deposits (*Lawrencia helmsii*, *Scaevola collaris, Neobassia astrocarpa, Zygophyllum compressum* and *Swainsona unifoliolata*). With the exception of the coastal distribution of *Neobassia astrocarpa*, these species have a scattered, disjunct distribution on saline gypseous substrates on inland salt lakes (Western Australian Herbarium 1998-). Growth on gypsum substrates, especially saline gypsum substrates, poses particular ecophysiological challenges for plants (Moore *et al.* 2014). All these species have previously been recorded as gyposphilous (Symon 2007). *Lawrencia helmsii* could be considered an obligate gypsophile and the other taxa facultative gypsophiles (Symon 2007) or gypsovags (Moore *et al.* 2014).

Other range extensions and new records for the Fortescue marsh included species found on specific substrates such as sand dunes (*Eucalyptus rowleyi*) and freshwater wetlands (*Polygonum plebeium, Triglochin hexagona*). New records for the Fortescue Marsh also extended to new records for the Fortescue sub-IBRA and Pilbara IBRA regions, showing that there is still scope for finding new flora in the region. The Marsh also supported populations of species greatly disjunct from their usual range (e.g. *Frankenia ambita, Eucalyptus rowleyi*), or near-endemics (*Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063), *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen 9702)). Among the 16 taxa of interest, many require further taxonomic work (many of which involve a species-complex or generic revision), including (sens. lat). *Goodenia pascua*, *Mimulus*, *Trianthema triquetrum*, *Tribulus terrestris* and *Portulaca oleracea*. These findings offer scope for further taxonomic, genetic and biogeographical investigations.

## 4.2 Species Distributions and Vegetation Community Zonation

### *4.2.1 Saline Plains*

The vegetation mapping of the Fortescue Marsh has provided an opportunity to explore vegetation community distributions across the Marsh, presumably as species respond to a range of interrelated environmental gradients (edaphic factors such as gypsum, salinity, pH, soil moisture, hydrological regimes, groundwater conditions, surface freshwater, proximity to other landforms, distance from Marsh edge, landform, topography). The predominance of stem-succulent halophytes reflects the extreme drought and salinity across the Marsh. A combination of gradients of soil water moisture, inundation frequency/duration and salinity appear to be to be affecting species distribution and community composition across the saline flood plains of the Marsh (Moir-Barnetson 2014, Moir-Barnetson *et al.* 2016, Barrett 2006, English & Colmer 2013).

One main feature of the Fortescue Marsh which sets it apart from other generally bare salt lakes in Western Australia is the extensive cover of samphire vegetation over most of the saline flats (Beard 1990). Bare lake beds are only restricted to far interior of the Marsh. Only annuals (*T. verrucosa* in saline flood plains, *Heliotropium curassavicum, Marsilea* spp., and *Trigonella suavissima* in freshwater inundated flood plains), can survive in these otherwise bare areas once surface waters have receded and the soils remain wet. From these inner limits, a sequence of vegetation communities spans the vegetated zone to the Marsh's outer edge. One primary driver of this zonation is the duration and frequency of waterlogging and inundation, which increases at the lower elevations and with distance from the Marsh edge (Moir-Barnetson 2014, Moir-Barnetson et al. 2016, Roullaird *et al*. 2015). Depths of surface water pools range from 0.3 m (Moir-Barnetson 2014) to >1.0 m (per. obs.). Two vegetation communities (Groups AA and AB) at this most extreme end of the vegetation zone are dominated by the submergence tolerant perennial samphires *Tecticornia medusa* and *T. pergranulata*. These species have a range of physiological traits to survive high salinity and prolonged

submergence during floods, such as the ability to withstand hydrostatic pressures of excessive tissue water uptake and the production of adventitious aerenchymatic “aquatic” roots to survive anoxic physiological conditions (Colmer *et al*. 2009, English & Colmer 2011, Moir-Barnetson 2014, Moir-Barnetson *et al.* 2016, Pederson *et al.* 2006, Rich *et al*. 2008, Short & Colmer 1999). In addition to *T. medusa* tolerating the same submergence regimes which kill *T. auriculata* and *T. indica,* it survives extreme soil moisture deficits during the dry season (Konnerup *et al.* 2015, Moir-Barnetson 2014).

It is noted that Community Groups AA and AB are distributed differently over the Marsh, where the *T. pergranulata*-dominated Group AA is restricted to the frequently-flooded, freshwater-flushed eastern flood plains around river channels, while *T.medusa*-dominated shrublands (Group AB) occupy saline lake beds that fill from distinctive inflow points. It is assumed that finer-scale difference in soil moisture levels, flood frequency/duration and soil and water salinity may account for this different dominance of *T. medusa* or *T. pergranulata*.

The other two dominant samphire species, *T. auriculata* and *T. indica* subsp. *bidens* (Community Groups C, BB, F and E), are widely distributed across the Fortescue Marsh where conditions are more moderate than the lowest elevations in the interior. Growth trials have demonstrated that *Tecticornia auriculata* tolerates relatively high salinity, and transect studies on the Fortescue Marsh have found abundance associated with higher soil pH values, moderate soil water availability, higher salinities and middle to high elevations (Moir-Barnetson 2014, Moir-Barnetson *et al.* 2016). As a relatively robust and tall shrub, mature plants of *Tecticornia auriculata* physically avoid inundation (Moir-Barnetson 2014). All these features would account for both the wide distribution of this species across the Marsh and its dominance in several Marsh Communities (particularly in Groups BB and E).

*Tecticornia indica* subsp. *bidens* is less tolerant of extreme salinity than *T. auriculata* and *T. medusa* (Moir-Barnetson 2014, Moir-Barnetson *et al.* 2016). While *T. indica* subsp. *bidens* is tolerant of waterlogging (English & Colmer 2011) relative to *T. medusa* and *T. pergranulata*, it is considerably less tolerant of both submergence and salinity (English & Colmer 2013, Moir-Barnetson 2014, Moir-Barnetson *et al.* 2016). Under similar high-salinity regimes *T. indica* subsp. *bidens* has 11–29% lower rate of growth but higher water use efficiency than *T. pergranulata* (English & Colmer 2013). This explains (at least in part) the distribution of *T. indica* subsp. *bidens* at higher elevations and in drier situations on salt lake margins (English & Colmer 2013), including the Fortescue Marsh margins where the shallow water table is deeper (>1.5 m) than in the Marsh interior (<1.0 m) (Moir-Barnetson 2014).

Other common species of *Tecticornia* and halophytes on the Fortescue Marsh have yet to be assessed for their ecophysiological responses to salinity, inundation and drought. *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) is mostly found on the Marsh margins, so would be expected to have ecophysiological tolerances and limits roughly similar to those of *T. indica* subsp. *bidens*. *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1063) ranges

further into the Marsh, indicating broader environmental tolerances, but its cover values are higher in the Marsh margin sites. *Tecticornia globulifera* was the distinctive component of Community Group BA on the Marsh interior as well as occurring closer to the margins. This samphire was observed to survive weeks of complete submergence which killed the co-occurring cohort of *Tecticornia indica* subsp. *bidens*. Therefore, with *Tecticornia globulifera* is the third species of a trio of inundation-tolerant samphires found on the Fortescue Marsh. *Muellerolimon salicorniaceum* is another significant species of the saline plains Community Groups E and F. Growing to heights of up to 2 m, aerial imagery and field observations confirm that this species avoids complete submergence over much of its range during flood events. Little is known on this halophytes' ecophysiology, but this is the only non-samphire shrub to dominate the Marsh interior. Its distribution would suggest a tolerance of a wide range of salinity and drought conditions, albeit possibly more sensitive to drought than *T. indica* and less tolerant of salinity than *T. auriculata*. The stems of *M. salicorniaceum* are covered in salt glands, so salt excretion is one strategy for growth on the saline flood plain soils. Seedling mortality from frequent inundation may be a major factor limiting its range into the Marsh interior. An understanding of the ecophysiology and recruitment of *Muellerolimon salicorniaceum* may help explain this species' distribution and the predominance of Community Group F in the more-frequently inundated eastern half of the Fortescue Marsh.

### *4.2.2. Fortescue Marsh margins*

A few vegetation communities cover much of the Fortescue Marsh saline plains, but this number of vegetation communities increases within a short distance of the Marsh margins. The species richness in these communities is relatively higher, with increased representation of non-samphire taxa (e.g. *Eremophila spongiocarpa*), and shrubs and herb taxa that occur over a range of Pilbara landforms. These communities are more structurally complex, with tall shrubs and low trees. This accrual of additional taxa on the margins is what differentiates subgroupings within Community Groups (CA vs CB), (DA vs DB), (EA, B, C), (FA vs FB). Relative to the Marsh interior, these marginal Marsh sites are less prone to inundation events (Roullaird *et al.* 2016), have less saline, gritty clay soils which can be drier (Moir-Barnetson 2014). Site physical properties (soil depth, rockiness), change over short distances from the Marsh outer boundary, many of these influenced by adjacent landforms. Although the topographical gradient is small, small changes in elevation is another factor likely to be influencing species distribution. Species were observed to respond to subtle changes in microtopography, where *M. salicorniaceum* and *T. auriculata* grew on low mounds formed by drainage, while *T.* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) was associated with low flats. This sharp environmental gradient at the Marsh edge was associated with a rapid turnover of species and vegetation communities.

A number of taxa indicate freshwater inputs to the Marsh margin, either as surface sheet flow, along minor drainage lines, or as subsurface flow. Some of these sites are near calcrete deposits along the northern edge of the Marsh. This accounts for large swards of *Sporobolis mitchellii,* patches of

*Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702), *Duma florulenta, Sesbania cannabina* and a few small but notable stands of *Typha domingensis* lining part of the northeast margin. These patches of *Sporobolis mitchellii* and Lignum (*Duma florulenta*) on the Fortescue Marsh flood plains are limited in their extent, and don't cover extensive areas of frequently inundated flood plains as they do in some central and eastern Australia wetlands (Taylor & Ganf 2005, Maher & Braithwaite 1992, CHAH 2015, Craig *et al.* 1991). Lignum (*Duma florulenta*) on the Fortescue Marsh is restricted to three community types (IA, IB and H) and, therefore, is geographically restricted to the northern fringes of the Marsh, the alluvial flats at the head of the Marsh and scattered within riparian vegetation. Any activity that could interrupt this freshwater flow (surface or subsurface) to these sites has the potential to impact these particular communities.

The *Melaleuca xerophila* tall shrublands (Community Group DB) were another distinctive community closely associated with the Marsh margins, in this case the boundary at the southern edge of the Marsh and extensive rocky calcrete plains of the Calcrete Land System. Other tall shrublands are located at the Marsh boundary, these being grassy Mulga woodlands (unsampled) and Community Group IB (with stands of *Melaleuca glomerata, Acacia aptaneura* and *Eucalyptus victrix*). While grasses and shrubs suggest a response to surface/subsurface freshwater drains, the deep-rooted shrubs and trees could have some ground-water dependence (i.e. facultative phreatophytics) (ENV 2013).

### *4.2.3 Restricted communities and the Fortescue Marsh*

A number of Vegetation Communities in the east of the Fortescue Marsh are associated with the alluvial flats, flood plains and river channels at the head of the Marsh. While Groups IB and E are located elsewhere over the Fortescue Marsh, Community Group H is a distinct eastern alluvial saltbush-lignum community restricted to these alluvial plains at the head of the Marsh. These eastern alluvial flood plains are less saline and experience flood events of short duration (as water flows onto the main Marsh flood plains). However, these areas were not able to be intensively surveyed for this current project and further survey is warranted to document the vegetation in these areas and confirm vegetation community boundaries in that region.

The red aeolian sand dunes in the south-east of the Marsh are small areas of sand deposits on small areas of calcrete and Marsh sediments. These landforms were not encountered elsewhere around the Marsh. Aeolian sandplains are not common landforms overall in the Pilbara (McKenzie *et al.* 2009, Thorne & Tyler 1997), but significant sandplain deposits occur in the southeast Fortescue subregion as outliers from the Little Sandy Desert. The taller dunes on the Marsh edge carry characteristic dune taxa typical of sandy desert dunefields east of the Pilbara (*Grevillea juncifolia, Ptilotus astrolasius*),

while the smaller dunes carry less diverse *Melaleuca glomerata* stands. The lowest dunes (0.5–1 m linear features) and sandy flats on the Marsh were found to support samphire Community Group EB or, in some cases, sparse *Melaleuca* spp. shrublands (Community DB, plot FORT079, Appendix 1). When located, the kopi dunes of Payne (2004) were found to be linear mounds of red sand (FORT077, Appendix 1). Although inadequately surveyed floristically in this study, more sampling will confirm the distinctiveness of the red sand dune vegetation from *Triodia* hummock grasslands.

Located within the region of the Fortescue Marsh are some landforms which support the Sand Dunes of the Hamersley Range/Fortescue Valley, a Priority 3 Ecological Community (PEC) (previously known as the 'Fortescue Valley Sand Dunes') (Department of Parks and Wildlife 2014a). These linear dunes of iron fines were found to carry Mulga and *Hakea lorea* over *Crotalaria cunninghamii, Corchorus laniflorus* and dense *Triodia* hummocks, and were observed to be quite dissimilar to the aoelian red sand dunes on the Marsh.

Although restricted to a small part of the Fortescue Marsh as a narrow, linear riparian strip, Community Group G is an important and distinctive community on the Marsh. These *Eucalyptus camaldulensis/Acacia ampliceps* riparian woodlands and shrublands provide habitat for birds, harbour uncommon flora and fringe a rare and valuable source of semi-permanent/permanent freshwater. It was not possible in this study to establish how far upstream this community extends east of 14 Mile Pool, but at some stage these transition along the Upper Fortescue River to *Eucalyptus camaldulensis /M. glomerata* woodlands over tussock grasses typical of Pilbara vegetation around ephemeral creeklines and rivers (Payne & Mitchell 1999, van Vreeswyk 2004).

These vegetation communities are among several on the Fortescue Marsh that are geographically restricted and vulnerable to particular threats because of their small size. Livestock and feral herbivores (donkeys, horses) are one issue. The riparian and alluvial communities (G, H) occur outside of the Conservation Estate/Zone and face heavy use from cattle which graze these grassy areas on alluvium, browse the shrublands, shelter under the Mulga and eucalyptus and use the freshwater pools. Parkinsonia threatens these eastern alluvial sites and communities H, IB, but the Mesquite Taskforce and NRM is effectively controlling this WONS species. Small in area, but unique for their flora and substrates, Gypsum outcrops and the vegetation (Community Group L) are being damaged by rabbits and invaded by Buffel Grass. This is an issue for both the vegetation and animals which shelter and use these outcrops. The *Melaleuca xerophila* woodlands (Community Group DB) have been observed to be impacted from feral ungulates, which seek shade and grazing in these tall shrublands.

## 4.3 Vegetation Mapping Methodology

One of the major outcomes of this project has been the production for the first time of a detailed vegetation map which covers the entire Fortescue Marsh land system. It has also described vegetation communities at a finer detail than described by Beard (1975) (1:1,000,000) and van Vreeswyk *et al*. (2004) (1:250,000). Although maps have been produced for parts of the Marsh, these only address proportionally small areas of the Marsh. There were limitations on resolving vegetation community boundaries, especially on the saline plains with ecotones, few reference landforms and only minor changes in topography over distance. Extensive ground-truthing was not possible for this survey, so there was considerable uncertainty mapping areas that had not been seen from the ground or for which no images were available. Features and vegetation were manually identified from high resolution aerial imagery, which is a standard technique for mapping but was found to be time consuming, required considerable prior knowledge of the Marsh flora and intensive field sampling. It cannot be emphasised enough that the high resolution (15 cm) aerial imagery was crucial for the mapping of these vegetation communities, and lower resolution aerial imagery and satellite imagery were found to be less informative or uninformative. Additional options that may be employed for such a project include remote sensing techniques of pixel- and object based image classification (Blascke 2010, Lewis *et al*. 2013), although aerial image interpretation can offer higher levels of accuracy than the other methods when compared (Lewis *et al.* 2013). There are examples of where remote sensing has been used for vegetation mapping of samphire communities (Adam *et al*. 2010, Kumar & Sinha 2014, Wang *et al.* 2007). More complex methods for vegetation mapping employ predictive mapping using spatial modelling (machine learning, artificial neural networks, species distribution modelling) of environmental, geographical and vegetation data (Adam *et al*. 2010, Xie *et al.* 2008, Ferrier *et al.* 2002).

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**Appendix 1: Species record from Fortescue Marsh Survey 2013-2014. Exotic taxa indicated by asterisk, and Priority Conservation listing indicated by number.**

| Family | Species |
|---|---|
| Acanthaceae | |
| | *Rostellularia adscendens* var. *clementii* |
| Aizoaceae | |
| | *Trianthema triquetrum* |
| | *Trianthema aff. triquetrum* |
| | *Trianthema turgidifolium* |
| Amaranthaceae | |
| | *Aerva javanica** |
| | *Alternanthera angustifolia* |
| | *Alternanthera denticulata* |
| | *Alternanthera nodiflora* |
| | *Gomphrena affinis* subsp. *pilbarensis* |
| | *Gomphrena kanisii* |
| | *Ptilotus astrolasius* |
| | *Ptilotus axillaris* |
| | *Ptilotus clementii* |
| | *Ptilotus gomphrenoides* var. *gomphrenoides* |
| | *Ptilotus helipteroides* |
| | *Ptilotus latifolius* |
| | *Ptilotus macrocephalus* |
| | *Ptilotus nobilis* subsp. *nobilis* |
| | *Ptilotus obovatus* |
| | *Ptilotus polystachyus* |
| Apocynaceae | |
| | *Sarcostemma viminale* subsp. *australe* |
| Asteraceae | |
| | *Angianthus cyathifer* |
| | *Bidens bipinnata** |
| | *Calocephalus beardii* |
| | *Calocephalus knappii* |
| | *Calotis hispidula* |
| | *Calotis plumulifera* |
| | *Calotis squamigera* **P1** |
| | *Centipeda crateriformis* subsp. *crateriformis* |

| | |
|---|---|
| | *Centipeda minima* subsp. *macrocephala* |
| | *Flaveria trinervia** |
| | *Gnephosis brevifolia* |
| | *Helichrysum luteoalbum* |
| | *Minuria integerrima* |
| | *Peripleura arida* |
| | *Pluchea dentex* |
| | *Pluchea dunlopii* |
| | *Pluchea ferdinandi-muelleri* |
| | *Pluchea rubelliflora* |
| | *Pluchea tetranthera* |
| | *Podolepis capillaris* |
| | *Pterocaulon sphacelatum* |
| | *Sonchus oleraceus** |
| | *Streptoglossa adscendens* |
| | *Streptoglossa bubakii* |
| | *Streptoglossa decurrens* |
| | *Streptoglossa liatroides* |
| | *Streptoglossa odora* |
| | *Streptoglossa tenuiflora* |
| Boraginaceae | |
| | *Ehretia saligna* var. *saligna* |
| | *Heliotropium chrysocarpum* |
| | *Heliotropium curassavicum* |
| | *Heliotropium europaeum* |
| | *Heliotropium glanduliferum* |
| | *Trichodesma zeylanicum* var. *grandiflorum* |
| | *Trichodesma zeylanicum* var. *zeylanicum* |
| Brassicaceae | |
| | *Lepidium phlebopetalum* |
| | *Lepidium platypetalum* |
| Capparaceae | |
| | *Capparis spinosa* var. *nummularia* |
| Caryophyllaceae | |
| | *Polycarpaea corymbosa var. corymbosa* |
| Celastraceae | |
| | *Stackhousia muricata* |
| Chenopodiaceae | |
| | *Atriplex amnicola* |
| | *Atriplex bunburyana* |

*Atriplex semilunaris*
*Atriplex codonocarpa*
*Atriplex flabelliformis* **P3**
*Chenopodium gaudichaudianum*
*Dissocarpus paradoxus*
*Dysphania melanocarpa forma leucocarpa*
*Dysphania plantaginella*
*Dysphania rhadinostachya subsp. inflata*
*Dysphania rhadinostachya subsp. rhadinostachya*
*Dysphania simulans*
*Dysphania sphaerosperma*
*Dysphania* congestiflora **P3**
*Einadia nutans* subsp. *eremaea*
*Enchylaena tomentosa* var. *tomentosa*
*Eremophea spinosa*
Maireana amoena
*Maireana carnosa*
*Maireana eriosphaera*
*Maireana integra*
*Maireana luehmannii*
*Maireana platycarpa*
*Maireana pyramidata*
*Maireana tomentosa* subsp. *tomentosa*
*Maireana triptera*
*Neobassia astrocarpa*
*Rhagodia eremaea*
*Salsola australis*
*Sclerolaena cornishiana*
*Sclerolaena costata*
*Sclerolaena cuneata*
*Sclerolaena* aff*. densiflora*
*Sclerolaena densiflora*
*Sclerolaena diacantha*
*Sclerolaena eriacantha*
*Sclerolaena lanicuspis*
*Sclerolaena recurvicuspis*
*Tecticornia auriculata*
*Tecticornia globulifera* **P1**
*Tecticornia indica* subsp. *bidens*
*Tecticornia indica* subsp. *leiostachya*

*Tecticornia medusa* **P3**
*Tecticornia pergranulata* subsp. *pergranulata*
*Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer *et al.* KS 1
*Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552)
*Tecticornia verrucosa*

Cleomaceae

*Cleome viscosa*

Convolvulaceae

*Convolvulus clementii*
*Cressa australis*
*Duperreya commixta*
*Evolvulus alsinoides* var. *villosicalyx*
*Ipomoea coptica*
*Ipomoea muelleri*
*Polymeria ambigua*

Cucurbitaceae

*Citrullus colocynthis**
*Cucumis melo*
*Cucumis variabilis*

Cyperaceae

*Bulbostylis barbata*
*Cyperus bifax*
*Cyperus bulbosus*
*Cyperus rigidellus*
*Cyperus squarrosus*
*Cyperus vaginatus*
*Eleocharis papillosa* **P3**
*Schoenoplectus dissachanthus*

Elatinaceae

*Bergia perennis* subsp. *obtusifolia*
*Bergia trimera*

Euphorbiaceae

*Euphorbia biconvexa*
*Euphorbia boophthona*
*Euphorbia tannensis* subsp. *eremophila*
*Euphorbia trigonosperma*
*Euphorbia vaccaria* var. *erucoides*

Fabaceae

*Acacia adsurgens*
*Acacia ampliceps*

*Acacia aptaneura*
*Acacia ? aptaneura x paraneura*
*Acacia bivenosa*
*Acacia bivenosa* x *sclerosperma* subsp. *sclerosperma*
*Acacia sclerosperma* subsp. *sclerosperma x bivenosa*
*Acacia coriacea* subsp. *pendens*
*Acacia dictyophleba*
*Acacia fuscaneura*
*Acacia paraneura*
*Acacia pruinocarpa*
*Acacia sclerosperma* subsp. *sclerosperma*
*Acacia stenophylla*
*Acacia synchronicia*
*Acacia tetragonophylla*
*Acacia victoriae*
*Acacia xiphophylla*
*Aeschynomene indica*
*Alysicarpus muelleri*
*Cullen cinereum*
*Cullen graveolens*
*Cullen leucochaites*
*Glycine canescens*
*Indigofera colutea*
*Indigofera georgei*
*Indigofera linifolia*
*Indigofera linnaei*
*Indigofera monophylla*
*Lotus cruentus*
*Neptunia dimorphantha*
*Parkinsonia aculeata**
*Rhynchosia australis*
*Senna artemisioides* subsp. *helmsii*
*Senna artemisioides* subsp. *oligophylla*
*Senna artemesioides* subsp. *helmsii* x *subsp*. *oligophylla*
*Senna artemisioides* subsp. x *artemisioides*
*Senna glaucifolia*
*Senna glutinosa* subsp. *chatelainiana*
*Senna glutinosa* subsp. *glutinosa*
*Senna glutinosa* subsp. x *luerssenii*
*Senna notabilis*

| | |
|---|---|
| | *Senna* sp. Meekatharra (E. Bailey 1-26) |
| | *Sesbania cannabina* |
| | *Swainsona kingii* |
| | *Swainsona leeana* |
| | *Swainsona tanamiensis* |
| | *Swainsona unifoliolata* |
| | *Tephrosia supina* |
| | *Trigonella suavissima* |
| | *Vachellia farnesiana** |
| Frankeniaceae | |
| | *Frankenia ambita* |
| | *Frankenia setosa* |
| Gentianaceae | |
| | *Schenkia clementii* |
| Goodeniaceae | |
| | *Goodenia* aff. *tenuiloba* |
| | *Goodenia forrestii* |
| | *Goodenia microptera* |
| | *Goodenia muelleriana* |
| | *Goodenia pascua* |
| | *Goodenia prostrata* |
| | *Goodenia* sp. East Pilbara (A.A. Mitchell PRP 727) **P3** |
| | *Scaevola amblyanthera* var. *centralis* |
| | *Scaevola collaris* |
| | *Scaevola parvifolia* subsp. *pilbarae* |
| | *Scaevola spinescens* |
| Juncaginaceae | |
| | *Triglochin hexagona* |

Lamiaceae

*Basilicum polystachyon*
*Dicrastylis cordifolia*
*Teucrium racemosum*

Malvaceae

*Abutilon cryptopetalum*
*Abutilon cunninghamii*
*Abutilon fraseri* subsp. *fraseri*
*Abutilon lepidum*
*Abutilon leucopetalum*
*Abutilon macrum*
*Abutilon malvifolium*
*Abutilon otocarpum*
*Abutilon oxycarpum* subsp. *prostrate* (A.A. Mitchell PRP 1266)
*Abutilon* sp. Pilbara (W.R. Barker 2025)
*Corchorus laniflorus*
*Corchorus lasiocarpus* subsp. *lasiocarpus*
*Corchorus sidoides* subsp. *sidoides*
*Corchorus tridens*
*Hibiscus brachychlaenus*
*Hibiscus brachysiphonius*
*Hibiscus leptocladus*
*Hibiscus sturtii* var. *campylochlamys*
*Hibiscus sturtii* var. *platychlamys*
*Lawrencia densiflora*
*Lawrencia glomerata*
*Lawrencia helmsii*
*Malvastrum americanum**
*Melhania oblongifolia*
*Sida arsiniata*
*Sida cardiophylla*
*Sida echinocarpa*
*Sida fibulifera*
*Sida* sp. Pindan (B.G. Thomson 3398
*Sida* sp. Rabbit Flat (B.J. Carter 626)
*Sida* sp. verrucose glands (F.H. Mollemans 2423)
*Sida trichopoda*

Marsileaceae

*Marsilea drummondii*
*Marsilea exarata*

| | |
|---|---|
| | *Marsilea hirsuta* |
| Molluginaceae | |
| | *Glinus lotoides* |
| | *Mollugo cerviana* |
| Myrtaceae | |
| | *Eucalyptus camaldulensis* subsp. *obtusa* |
| | *Eucalyptus rowleyi* **P3** |
| | *Eucalyptus victrix* |
| | *Melaleuca glomerata* |
| | *Melaleuca xerophila* |
| Nyctaginaceae | |
| | *Boerhavia coccinea* |
| Phrymaceae | |
| | *Peplidium* sp. C Evol. Fl. Fauna Arid Aust. (N.T. Burbidge & A. Kanis 8158) |
| | *Peplidium* sp. E Evol. Fl. Fauna Arid Aust. (A.S. Weston 12768) |
| | *Mimulus* aff *gracilis* |
| Phyllanthaceae | |
| | *Phyllanthus maderaspatensis* |
| | *Sauropus trachyspermus* |
| Pittosporaceae | |
| | *Pittosporum angustifolium* |
| Plantaginaceae | |
| | *Stemodia grossa* |
| | *Stemodia viscosa* |
| Plumbaginaceae | |
| | *Muellerolimon salicorniaceum* |
| Poaceae | |
| | *Acrachne racemosa* |
| | *Aristida contorta* |
| | *Aristida holathera* var. *holathera* |
| | *Aristida inaequiglumis* |
| | *Aristida latifolia* |
| | *Brachyachne prostrata* |
| | *Cenchrus ciliaris** |
| | *Cenchrus setiger* |
| | *Chloris pectinata* |
| | *Chloris pumilio* |
| | *Chloris virgata** |
| | *Cymbopogon ambiguus* |

*Cynodon dactylon*
*Dactyloctenium radulans*
*Dichanthium sericeum* subsp. *humilius*
*Digitaria brownii*
*Digitaria coenicola*
*Echinochloa colona**
*Enneapogon caerulescens*
*Enneapogon polyphyllus*
*Enteropogon ramosus*
*Eragrostis crateriformis* **P3**
*Eragrostis cumingii*
*Eragrostis desertorum*
*Eragrostis dielsii*
*Eragrostis eriopoda*
*Eragrostis falcata*
*Eragrostis leptocarpa*
*Eragrostis pergracilis*
*Eragrostis setifolia*
*Eragrostis setifolia* x *xerophila* intergrade
*Eragrostis tenellula*
*Eragrostis xerophila*
*Eriachne aristidea*
*Eriachne flaccida*
*Eriachne helmsii*
*Eriachne mucronata*
*Eriachne obtusa*
*Eriochloa pseudoacrotricha*
*Eulalia aurea*
*Iseilema vaginiflorum*
*Leptochloa fusca* subsp. *muelleri*
*Panicum decompositum*
*Panicum laevinode*
*Paractaenum refractum*
*Paraneurachne muelleri*
*Paspalidium* aff. *jubiflorum*
*Paspalidium constrictum*
*Paspalidium reflexum*
*Setaria dielsii*
*Setaria verticillata**
*Sporobolus australasicus*

| | |
|---|---|
| | *Sporobolus caroli* |
| | *Sporobolus mitchellii* |
| | *Tragus australianus* |
| | *Triodia angusta* |
| | *Triodia basedowii* |
| | *Triodia epactia* |
| | *Triodia longiceps* |
| | *Triodia schinzii* |
| | *Triraphis mollis* |
| | *Urochloa occidentalis* var. *occidentalis* |
| | *Xerochloa barbata* |
| Polygonaceae | |
| | *Duma florulenta* |
| | *Polygonum plebeium* |
| Portulacaceae | |
| | *Calandrinia ptychosperma* |
| | *Portulaca filifolia* |
| | *Portulaca intraterranea* |
| | *Portulaca oleracea* |
| *Potamogetonaceae* | |
| | *Lepilaena preissii* |
| Primulaceae | |
| | *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) **P1** |
| Proteaceae | |
| | *Grevillea juncifolia* subsp. *juncifolia* |
| | *Grevillea striata* |
| | *Hakea lorea* subsp. *lorea* |
| Pteridaceae | |
| | *Cheilanthes sieberi* subsp. *sieberi* |
| Rubiaceae | |
| | *Synaptantha tillaeacea* var. *tillaeacea* |
| Ruppiaceae | |
| | *Ruppia maritima* |
| Santalaceae | |
| | *Anthobolus leptomerioides* |
| | *Santalum lanceolatum* |
| Sapindaceae | |
| | *Atalaya hemiglauca* |
| | *Dodonaea coriacea* |
| Scrophulariaceae | |

| | |
|---|---|
| | *Eremophila cuneifolia* |
| | *Eremophila forrestii* subsp. *forrestii* |
| | *Eremophila lanceolata* |
| | *Eremophila latrobei* subsp. *filiformis* |
| | *Eremophila longifolia* |
| | *Eremophila maculata* subsp. *brevifolia* |
| | *Eremophila spongiocarpa* **P1** |
| | *Eremophila youngii* subsp. lepidota **P4** |
| Solanaceae | |
| | *Nicotiana heterantha* **P1** |
| | *Solanum cleistogamum* |
| | *Solanum lasiophyllum* |
| | *Solanum morrisonii* |
| | *Solanum nigrum* |
| Surianaceae | |
| | *Stylobasium spathulatum* |
| Typhaceae | |
| | *Typha domingensis* |
| Zygophyllaceae | |
| | *Tribulus* aff *eichlerianus* |
| | *Tribulus hirsutus* |
| | *Tribulus occidentalis* |
| | *Zygophyllum compressum* |
| | *Zygophyllum eichleri* |

# Appendix 2: Data for 128 Plots Established on the Fortescue Marsh between 2013 –and 2014.

**Appendix 3: Two Way Site x Taxa Table of 128 Plots and 196 Taxa (amalgamated dataset), Sorted by Site and Species Classifications. Mid-Point Cover-Abundance values are given and colour coded from green-yellow-orange- red in order of increasing values**.

# Appendix 4 Electronic appendix map shape files

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT001

**Date established:** 3/08/2013 **Date rescored:** 14/06/2014

**Lat/Long (dd WGS84):** -22.38938989°S 119.0836886°E

**MGA** **Zone 50** 714521.7823mE 7522585.759mN

**Location:** On SW side of Fortescue Marsh, 8.8 km ESE of Cowra Line Camp, 11.1 km S of Kardardarrie Well, 5.8 km N of Mingah Well, 42.9 km NW of Marillana Homestead

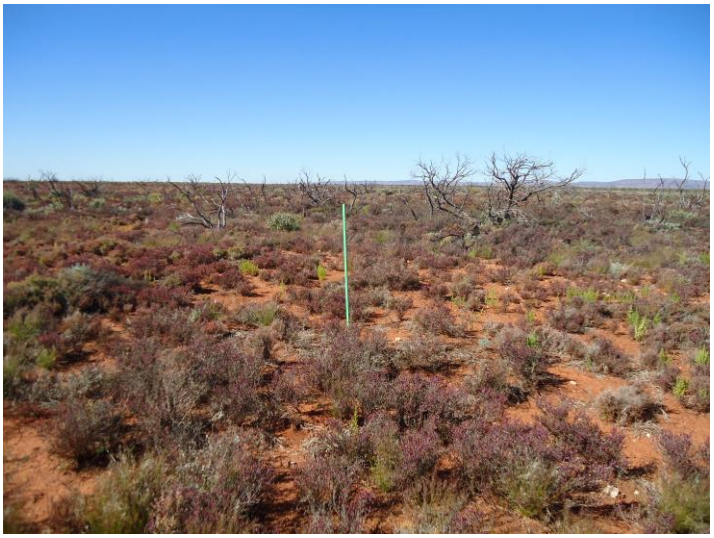
**Vegetation:** Sparse *Tecticornia auriculata*, *Tecticornia indica* subsp. *bidens* chenopod shrubland over very sparse *Eragrostis dielsii* grassland.

**Site:** Extensive saline flood plain and lake bed with skeletal, red-orange, silty loam soils.

**Floristic Community: Group EB**

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cyperus bulbosus* | - | <1% |
| *Eragrostis dielsii* | 2-5% | 60-65% |
| *Maireana luehmannii* | < 1% | <1% |
| *Muellerolimon salicorniaceum* | <1% | <1% |
| *Nicotiana heterantha* | - | <1% |
| *Salsola australis* | <1% | <1% |
| *Tecticornia auriculata* | 10-8% | 10-15% |
| *Tecticornia indica* subsp. *bidens* | 15% | 15% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552), | < 1% | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.



## Site FORT002

**Date established:** 4/08/2013 **Date rescored:** 14/06/2014

**Lat/Long (dd):** -22.41369473°S 119.0802709°E

**MGA** **Zone 50** 714132.5481mE 7519899.028mN

**Location:** On SW margin of Fortescue Marsh, 9.7 km SE of Cowra Line Camp, 13.8 km S of Kardardarrie Well, 3.1 km N of Mingah Well, 41.6 km NW of Marillana Homestead.

**Vegetation:** Very sparse *Eremophila spongiocarpa* and *Tecticornia indica* subsp. *bidens* shrubland over mid-dense grassland and shrubland of *Tecticornia indica* subsp. *bidens*, *Sporobolus australasicus*, *Eragrostis dielsii*, *Eremophea spinosa*, *Chloris pectinata*, *Lawrencia densiflora*, *Dissocarpus paradoxus*, *Enneapogon* ssp. and *Sida fibulifera*

**Site:** Stony plains on margin of extensive saline flood plain and lake bed with surface fragments of calcrete on shallow, red-brown-light red-brown, loamy sand soils.

**Floristic Community: Group CB**

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Abutilon fraseri* subsp. fraseri | <1% | <1% |
| *Acacia bivenosa* x *sclerosperma* subsp. | <1% | <1% |
| *Acacia tetragonophylla* | <1% | <1% |
| *Angianthus cyathifer* | <1% | - |
| *Aristida latifolia* | <1% | - |
| *Atriplex flabelliformis* | <1% | - |
| *Boerhavia coccinea* | - | <1% |
| *Cenchrus ciliaris* | <1% | <1% |
| *Chloris pectinata* | <1% | - |
| *Chloris pumilio* | - | <1% |
| *Convolvulus clementii* | <1% | - |
| *Cressa australis* | <1% | <1% |
| *Cucumis melo* | - | <1% |
| *Cullen cinereum* | <1% | <1% |
| *Cyperus bulbosus* | - | <1% |
| Cyperus squarrosus | - | <1% |
| *Dactyloctenium radulans* | <1% | 5-8% |
| *Dichanthium sericeum* subsp. *humilius* | - | <1% |
| *Dissocarpus paradoxus* | <1% | <1% |
| *Dysphania congestiflora* | - | <1% |
| *Enchylaena tomentosa* var. *tomentosa* | <1% | <1% |
| *Enneapogon caerulescens* | <1% | <1% |
| *Enneapogon polyphyllus* | <1% | <1% |
| *Eragrostis dielsii* | 15-20% | 15-20% |
| *Eremophea spinosa* | <1% | <1% |
| *Eremophila spongiocarpa* | 1-2% | 1-2% |
| *Euphorbia biconvexa* | - | <1% |
| *Evolvulus alsinoides* var. *villosicalyx* | <1% | - |
| *Flaveria trinervia* | <1% | <1% |
| *Goodenia forrestii* | - | <1% |
| *Goodenia muelleriana* | <1% | - |
| *Ipomoea coptica* | - | <1% |
| *Lawrencia densiflora* | <1% | <1% |
| *Lotus cruentus* | <1% | - |
| *Maireana luehmannii* | <1% | - |
| *Malvastrum americanum* | <1% | - |
| *Muellerolimon salicorniaceum* | <1% | <1% |
| *Nicotiana heterantha* | <1% | <1% |
| *Pluchea dunlopii* | <1% | <1% |
| *Pluchea rubelliflora* | - | <1% |
| *Pterocaulon sphacelatum* | <1% | <1% |
| *Ptilotus nobilis* subsp. *nobilis* | <1% | <1% |
| *Rhagodia eremaea* | - | <1% |
| *Rhynchosia australis* | <1% | <1% |
| *Scaevola spinescens* | <1% | <1% |
| *Senna artemisioides* subsp. *oligophylla* | <1% | <1% |
| *Setaria verticillata* | <1% | <1% |
| *Sida fibulifera* | <1% | <1% |
| *Solanum lasiophyllum* | <1% | - |
| *Solanum morrisonii* | <1% | <1% |
| *Sporobolus australasicus* | 2% | 5% |
| *Stemodia grossa* | <1% | <1% |
| *Streptoglossa bubakii* | 2% | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

| | | |
|---|---|---|
| *Streptoglossa decurrens* | <1% | <1% |
| *Streptoglossa liatroides* | - | <1% |
| *Streptoglossa tenuiflora* | - | <1% |
| *Swainsona kingii* | <1% | <1% |
| *Swainsona leeana* | <1% | - |
| *Tecticornia auriculata* | <1% | <1% |
| *Tecticornia indica* subsp. *bidens* | M | 30-35% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | 5% | 5% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | 10 % | 8-10% |
| *Trianthema triquetrum* | <1% | <1% |
| *Zygophyllum eichleri* | <1% | - |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT003

**Date established:** 4/08/2013 **Date rescored:** 14/06/2014

**Lat/Long (dd):**-22.35805465°S 119.0862289

**MGA** **Zone 50** 714831.5141mE 7526052.307mN

**Location:** On west side of Fortescue Marsh, 8.6 km E of Cowra Line Camp, 7.7 km S of Kardardarrie Well, 9.3 km N of Mingah Well, 45 km NW of Marillana Homestead, 36.1 km W of Cloudbreak Mine Village.

**Vegetation:** Very sparse - isolated shrubs of *Tecticornia indica* subsp. *bidens* over sparse shrubs and grasses of *Frankenia ambita* and *Eragrostis dielsii*

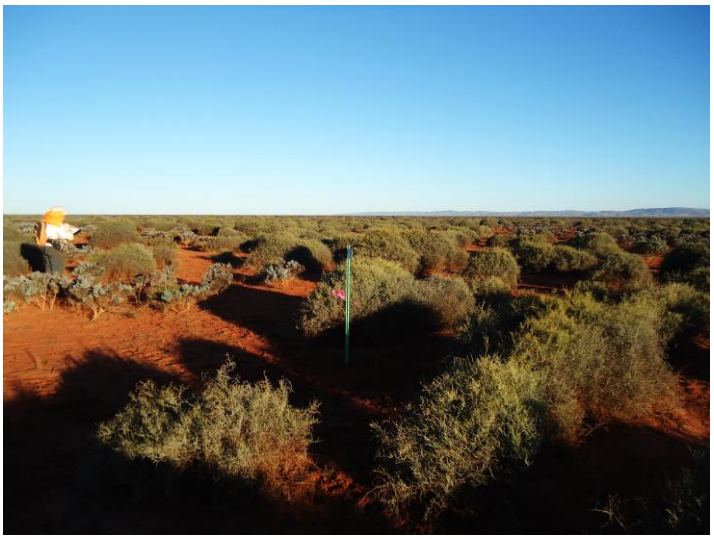
**Site:** Extensive saline flood plain and lake bed with surface fragments of BIF, calcite and quartz colluvium from Goodiagarvie hills on shallow, pale orange-brown, loam soils.

**Floristic Community: Group EC**

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cenchrus ciliaris* | <1% | - |
| *Cucumis melo* | - | <1% |
| *Eleocharis papillosa* | - | 75% |
| *Eragrostis dielsii* | 20-25% | 20-30% |
| *Flaveria trinervia* | <1% | - |
| *Frankenia ambita* | <1% | <1% |
| *Gomphrena affinis* subsp. *pilbarensis* | <1% | - |
| *Heliotropium curassavicum* | < 1% | <1% |
| *Maireana luehmannii* | <1% | - |
| *Mimulus* aff *gracilis* | - | <1% |
| *Nicotiana heterantha* | <1% | <1% |
| *Peplidium* sp. E Evol. Fl. Fauna Arid Aust. (A.S. Weston 12768) | - | <1% |
| *Ptilotus nobilis* subsp. *nobilis* | <1% | - |
| *Salsola australis* | <1% | - |
| *Senna artemisioides* subsp. *helmsii* | <1% | - |
| *Tecticornia indica* subsp. *bidens* | 2% | <1% |
| *Tecticornia indica* subsp. *leiostachya* | <1% | <1% |
| *Trianthema triquetrum* | <1% | - |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT004



**Date established:** 4/08/2013 **Date rescored:** 14/06/2014

**Lat/Long (dd):** -22.37833165°S 119.0818839

**MGA** **Zone 50** 714352.8765mE 7523812.961mN

**Location:** On western side of Fortescue Marsh, 8.3 km E of Cowra Line Camp, 9.9 km S of Kardardarrie Well, 7 km N of Mingah Well, 43.8 km NW of Marillana Homestead, 36.9 km WSW of Cloudbreak Mine Village.

**Vegetation:** Mid-dense *Muellerolimon salicorniaceum* and *Tecticornia auriculata* shrubland over very sparse *Eragrostis* dielsi tussock grasses and *Tecticornia indica* subsp. *bidens* young shrubs.

**Site:** Extensive saline flood plain and lake bed with shallow, red-brown, silty loam soils.

**Floristic Community: Group EC**

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cyperus bulbosus* | - | <1% |
| *Eleocharis papillosa* | - | <1% |
| *Eragrostis dielsii* | 5% | 50% |
| *Muellerolimon salicorniaceum* | 25% | 25% |
| *Nicotiana heterantha* | <1% | <1% |
| *Tecticornia auriculata* | 10% | 8-10% |
| *Tecticornia globulifera* | <1% | <1% |
| *Tecticornia indica* subsp. *bidens* | 2% | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT005

**Date established:** 5/08/2013 **Date rescored:** 20/06/2014

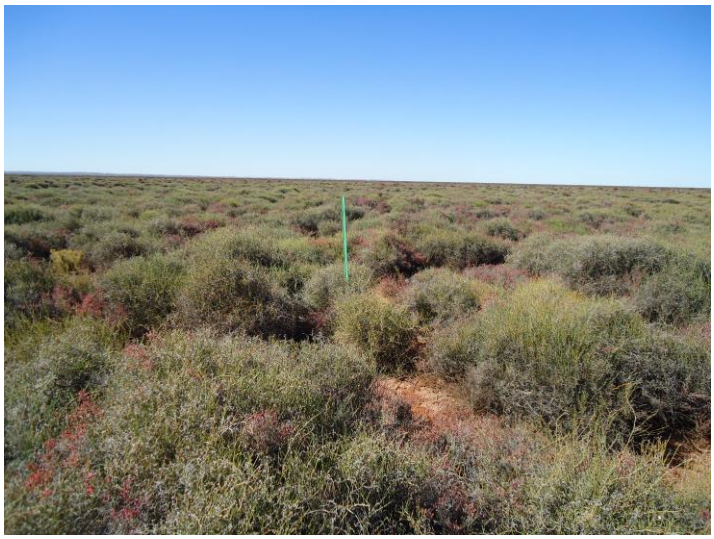
**Lat/Long (dd):** -22.47547086°S 119.4856871°E

**MGA** **Zone 50** 755767.7965mE 7512421.689mN

**Location:** On southern side of Fortescue Marsh, 6.8 km ENE of Paroo Well, 28 km SE of Minga Bore,19.2 km NNE of Marillana Homestead, 24.4 km SW of Karntama Village (Christmas Creek Mine).

**Vegetation:** Mid-dense *Muellerolimon salicorniaceum* shrubland over *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)& T. Colmer et al. KS 1063) and *Frankenia ambita* sparse shrubland.

**Site:** Margin of extensive saline flood plain and lake bed on deep (>0.5m), milk coffee brown - pale red-brown, loamy sand soils.



| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Frankenia ambita* | <1% | <1% |
| *Lawrencia densiflora* | - | <1% |
| *Muellerolimon salicorniaceum* | 55-60% | 50-55% |
| *Nicotiana heterantha* | - | <1% |
| *Swainsona kingii* | - | <1% |
| *Tecticornia auriculata* | <1% | <1% |
| *Tecticornia globulifera* | 15% | <1% |
| *Tecticornia indica* subsp. *bidens* | <1% | <1% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | 15% | 20% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | 5% | 10% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT006

**Date established:** 5/08/2013 **Date rescored:** 20/06/2014

**Lat/Long (dd):**-22.47940717°S 119.509758°E

**MGA** **Zone 50** 758238.418mE 7511944.349mN

**Location:** On southern side of Fortescue Marsh, 9 km ENE of Paroo Well, 30.3 km SE of Minga Bore,22.8 km SW of Karntama Village (Christmas Creek Mine), 20 km NNE of Marillana Homestead.

**Vegetation:** Mid-dense *Tecticornia auriculata* chenopod shrubland over mid-dense *Eragrostis dielsii* tussock grassland.

**Site:** Extensive saline flood plain and lake bed with surface fragments of snail shells, and mixture of BIF and quartz on deep (>0.5m), red-brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cyperus bulbosus* | - | 2-5% |
| *Eragrostis dielsii* | 2-5%* | 70-75 % |
| *Heliotropium curassavicum* | - | <1% |
| *Mimulus* aff *gracilis* | - | <1% |
| *Muellerolimon salicorniaceum* | 5% | 1-2% |
| *Nicotiana heterantha* | <1% | <1% |
| *Swainsona tanamiensis* | - | 3-5% |
| *Tecticornia auriculata* | 45% | 35-40% |
| *Tecticornia globulifera* | <1% | <1% |

*40% dead cover

## Site FORT007

**Date established:** 7/08/2013 **Date rescored:** Not rescored

**Lat/Long (dd):** -22.4843587°S 119.5700234°E

**MGA** **Zone 50** 764432.8732mE 7511290.637mN

**Location:** Central region of Fortescue Marsh, 15 km E of Paroo Well, 35.8 km ESE of Minga Bore, 19.2 km SSW of Karntama Village (Christmas Creek Mine), 23.5 km NE of Marillana Homestead.

**Vegetation:** Very sparse *Tecticornia indica* subsp. *bidens* and *Tecticornia auriculata* chenopod shrubland over mid-dense herbfield of *Cressa australis*.

Site: Extensive saline flood plain and lake bed with surface fragments of shell on deep (>0.5m), grey-brown, loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Atriplex flabelliformis* | <1% | not rescored |
| *Cressa australis* | 30-35% | not rescored |
| *Heliotropium curassavicum* | <1% | not rescored |
| *Muellerolimon salicorniaceum* | <1% | not rescored |
| *Salsola australis* | <1% | not rescored |
| *Swainsona kingii* | <1% | not rescored |
| *Swainsona tanamiensis* | <1% | not rescored |
| *Tecticornia auriculata* | <1% | not rescored |
| *Tecticornia indica* subsp. *bidens* | 2-5% | not rescored |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT008

**Date established:** 7/08/2013 **Date rescored:** Not rescored

**Lat/Long (dd):** -22.4837578°S 119.5611649°E

**MGA** **Zone 50** 763522.1165mE 7511372.826mN

**Location:** Central region of Fortescue Marsh, 14.1 km E of Paroo Well, 35 km ESE of Minga Bore, 19.6 km SW of Karntama Village (Christmas Creek Mine), 22.9 km NE of Marillana Homestead.

**Vegetation:** Mid-dense *Muellerolimon salicorniaceum* shrubland over very sparse chenopod shrubland of *Tecticornia indica* subsp. *bidens*, *Tecticornia auriculata* and *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552).

**Site:** Extensive saline flood plain and lake bed with surface fragments of shell on deep (>0.5m), coffee to red-brown, loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Atriplex flabelliformis* | <1% | not rescored |
| *Cressa australis* | <1% | not rescored |
| *Eragrostis dielsii* | <1% | not rescored |
| *Eragrostis pergracilis* | <1% | not rescored |
| *Heliotropium curassavicum* | <1% | not rescored |
| *Muellerolimon salicorniaceum* | 40-45% | not rescored |
| *Sclerolaena lanicuspis* | <1% | not rescored |
| *Tecticornia auriculata* | 2-3% | not rescored |
| *Tecticornia globulifera* | <1% | not rescored |
| *Tecticornia indica* subsp. *bidens* | 2-5% | not rescored |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | <1% | not rescored |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | <1% | not rescored |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT009

**Date established:** 7/08/2013 **Date rescored:** 19/06/2014

**Lat/Long (dd):**-22.48456062°S 119.5397368°E

**MGA** **Zone 50** 761314.8063mE 7511321.472mN

**Location:** Central region of Fortescue Marsh, 11.9 km E of Paroo Well, 33.2 km ESE of Minga Bore, 21 km SW of Karntama Village (Christmas Creek Mine), 21.3 km NE of Marillana Homestead.

**Vegetation:** Very sparse shrubland of Muellerilomin salicorniaceum over mid-dense *Tecticornia indica* subsp. *bidens* chenopod shrubland over very sparse *Tecticornia indica* subsp. *bidens* seedlings.

**Site:** Extensive saline flood plain and lake bed with surface fragments of shell on deep (>0.5m), coffee to red-brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Angianthus cyathifer* | - | <1% |
| *Atriplex flabelliformis* | <1% | <1% |
| *Cressa australis* | <1% | <1% |
| *Dysphania congestiflora* | - | <1% |
| *Eleocharis papillosa* | - | <1% |
| *Eragrostis dielsii* | <1% | <1% |
| *Frankenia ambita* | - | <1% |
| *Heliotropium curassavicum* | - | 1-2% |
| *Maireana luehmannii* | <1% | - |
| *Mimulus* aff *gracilis* | - | 50% |
| *Muellerolimon salicorniaceum* | 2-1% | 1(-2)% |
| *Nicotiana heterantha* | <1% | 5% |
| *Tecticornia globulifera* | <1% | <1% |
| *Tecticornia indica* subsp. *bidens* | 40-45% | 40% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | <1% | - |
| *Triglochin hexagona* | - | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT010

**Date established:** 7/08/2013 **Date rescored:**19/06/2014

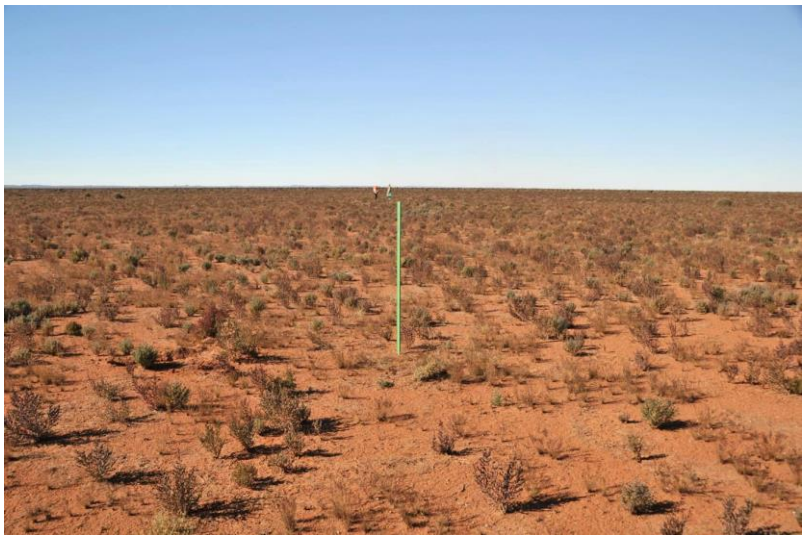
**Lat/Long (dd):**-22.48173416°S 119.5247976°E

**MGA** **Zone 50** 759782.2698mE 7511660.566mN

**Location:** Central region of Fortescue Marsh, 10.4 km E of Paroo Well, 21.9 km SW of Karntama Village (Christmas Creek Mine), 20.7 km NE of Marillana Homestead.

**Vegetation:** Isolated *Muellerolimon salicorniaceum* shrubs over mid-dense young shrub cohort of *Tecticornia indica* subsp. *bidens*, *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) and *Tecticornia globulifera* and *Eragrostis dielsii* tussock grasses.

**Site:** Extensive saline flood plain and lake bed with surface fragments of shell on deep (>0.5m), red to coffee brown, silty loam soils.



| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Atriplex flabelliformis* | 1% | <1% |
| *Cressa australis* | - | <1% |
| *Eleocharis papillosa* | - | 40-45% |
| *Eragrostis dielsii* | 15-20% | <1% |
| *Frankenia ambita* | <1% | <1% |
| *Heliotropium curassavicum* | - | <1% |
| *Maireana luehmannii* | 5-8% | <1% |
| *Mimulus* aff *gracilis* | - | 30% |
| *Muellerolimon salicorniaceum* | <1% | <1% |
| *Nicotiana heterantha* | - | <1% |
| *Tecticornia auriculata* | <1% | - |
| *Tecticornia globulifera* | 2% | 1-2% |
| *Tecticornia indica* subsp. *bidens* | 5-8% | 2-5% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | <1% | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | 1% | - |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT011

**Date established:** 7/08/2013 **Date rescored:** 18/06/2014

**Lat/Long (dd):**-22.47817218 °S 119.4527614°E

**MGA** **Zone 50** 752373.4816mE 7512178.354mN

**Location:** On southern margin of Fortescue Marsh, 3.7 km NE of Paroo Well, 27.3 km SW of Karntama Village (Christmas Creek Mine), 17.8 km NNE of Marillana Homestead.

**Vegetation:** Mid-dense shrubland of *Acacia bivenosa*, *Acacia tetragonophylla*, *Melaleuca glomerata* and *Eremophila longifolia* over mid-dense *Triodia epactia*hummock and *Cenchrus ciliaris* tussock grassland.

**Site:** Extensive, flat calcrete plain with surface fragments of calcrete on shallow, red-brown, sandy loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Abutilon* cf. otocarpum | <1% | <1% |
| *Abutilon* otocarpum | <1% | <1% |
| *Acacia bivenosa* x *sclerosperma* subsp. | 25-30% | 25-30% |
| *Acacia synchronicia* | <1% | <1% |
| *Acacia tetragonophylla* | <1% | <1% |
| *Aristida contorta* | <1% | - |
| *Atriplex bunburyana* | <1% | <1% |
| *Cenchrus ciliaris* | 1% | <1% |
| *Corchorus sidoides* subsp. *sidoides* | <1% | <1% |
| *Einadia nutans* subsp. *eremaea* | <1% | <1% |
| *Enchylaena tomentosa* var. *tomentosa* | <1% | <1% |
| *Enneapogon caerulescens* | <1% | |
| *Enneapogon polyphyllus* | <1% | <1% |
| *Enteropogon ramosus* | - | <1% |
| *Eragrostis* setifolia x *xerophila* intergrade | <1% | <1% |
| *Eragrostis dielsii* | <1% | <1% |
| *Eragrostis eriopoda* | <1% | <1% |
| *Eremophila* forrestii subsp. forrestii | <1% | <1% |
| *Eremophila longifolia* | 1% | <1% |
| *Euphorbia tannensis* subsp. *eremophila* | <1% | <1% |
| *Evolvulus alsinoides* var. *villosicalyx* | <1% | - |
| *Goodenia forrestii* | <1% | <1% |
| Heliotropium chrysocarpum | <1% | <1% |
| *Hibiscus sturtii* var. *campylochlamys* | <1% | <1% |
| *Hibiscus sturtii* var. platychlamys | <1% | <1% |
| Indigofera monophylla | <1% | <1% |
| *Maireana tomentosa* subsp. *tomentosa* | <1% | - |
| *Maireana* triptera | <1% | <1% |
| *Malvastrum americanum* | <1% | - |
| *Melaleuca glomerata* | 10-15% | 8-10% |
| Paraneurachne muelleri | <1% | <1% |
| *Pterocaulon sphacelatum* | <1% | - |
| Ptilotus axillaris | <1% | - |
| *Ptilotus nobilis* subsp. *nobilis* | <1% | <1% |
| *Ptilotus obovatus* | <1% | <1% |
| *Rhagodia eremaea* | <1% | <1% |
| *Rhynchosia australis* | - | <1% |
| *Salsola australis* | <1% | - |
| Scaevola amblyanthera var. centralis | <1% | <1% |
| *Scaevola spinescens* | <1% | <1% |
| *Senna artemisioides* subsp. *oligophylla* | 1% | <1% |
| *Sida fibulifera* | <1% | <1% |
| *Solanum lasiophyllum* | <1% | <1% |
| *Solanum morrisonii* | <1% | <1% |
| *Sporobolus australasicus* | - | <1% |
| Stackhousia muricata | <1% | - |
| *Triodia epactia* | 40-45% | 45% |
| *Triodia longiceps* | <1% | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT012

**Date established:** 8/08/2013**Date rescored:** 15/07/2014

**Lat/Long (dd):** -22.54436458°S 119.6398255°E

**MGA** **Zone 50** 71501.1092mE 7504518.3647mN

**Location:** On southern margin of Fortescue Marsh, 25.8 km ENE of Marillana Homestead, 33.7 kmWNW of Roy Hill Homestead, 22.6 km ESE of Paroo Well , 22.9 km S of Karntama Village (Christmas Creek Mine).

**Vegetation:** Mid-dense *Tecticornia auriculata* chenopod shrubland over isolated plants of *Eragrostis* per*gracilis*, *Lawrencia* glomerata and *Swainsona tanamiensis*.

**Site:** Extensive saline flood plain and lake bed with deep (>0.5m), red-brown, loamy sand soils

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cyperus bulbosus* | - | <1% |
| *Eragrostis* per*gracilis* | <1%, 1 plant | 60-70% |
| *Lawrencia* glomerata | <1% | <1% |
| *Maireana luehmannii* | <1% | - |
| *Swainsona tanamiensis* | <1% | 1-2% |
| *Tecticornia auriculata* | 45% (50%) | 40-45% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT013

**Date established:** 8/08/2013 **Date rescored:**15/07/2014

**Lat/Long (dd):**-22.54504192 °S 119.637652°E

**MGA** **Zone 50** 71276.1291mE 7504447.2837mN

**Location:** On southern margin of Fortescue Marsh, 22.4 km ESE of Paroo Well, 23 km S of Karntama Village (Christmas Creek Mine), 25.6 km ENE of Marillana Homestead, 33.2 km W of Roy Hill summit.

**Vegetation:** Mid-dense mixed shrubland of *Muellerolimon salicorniaceum*, *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)& T. Colmer et al. KS 1063) and *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552).

**Site:** Margin of extensive saline flood plain and lake bed adjacent to calcrete plain with surface fragments of shell and calcrete on shallow, red-brown to coffee brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cressa australis* | - | <1% |
| *Cyperus bulbosus* | - | <1% |
| Dysphania sphaerosperma | - | <1% |
| *Eragrostis* per*gracilis* | - | <1% |
| *Muellerolimon salicorniaceum* | 10-15% | 20% |
| *Nicotiana heterantha* | - | <1% |
| *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) | <1% | <1% |
| *Sporobolus australasicus* | - | <1% |
| *Swainsona kingii* | - | <1% |
| *Tecticornia auriculata* | 1-2% | 1-2% |
| *Tecticornia indica* subsp. *bidens* | <1% | <1% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | 35-40% | 35% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | 8-10% | 8-10% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT014

**Date established:** 8/08/2013**Date rescored:**15/07/2014

**Lat/Long (dd):**-22.54466993°S 119.6362382°E

**MGA** **Zone 50** 71131.3808mE 7504491.0597mN

**Location:** On southern margin of Fortescue Marsh, 25.5 km ENE of Marillana Homestead, 34.1 km WNW of Roy Hill Homestead 22.3 km ESE of Paroo Well and 23 km S of Karntama Village (Christmas Creek Mine).

**Vegetation:** Sparse *Eremophila spongiocarpa* and *Muellerolimon salicorniaceum* shrubland and *Triodia longiceps* hummocks over mid-dense *Tecticornia indica* subsp. *bidens*, *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) and *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)& T. Colmer et al. KS 1063) chenopod shrubland over very sparse

**Site:** Margin of extensive saline flood plain and lake bed adjacent to calcrete plain with surface fragments of calcrete. Very slightly rocky calcrete outcrop with shallow, orange-brown, loamy sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Aerva javanica* | <1% | - |
| *Aristida contorta* | <1% | <1% |
| *Cenchrus ciliaris* | <1% | <1% |
| *Corchorus* tridens | - | <1% |
| *Cullen cinereum* | <1% | <1% |
| *Dysphania plantaginella* | - | <1% |
| *Enneapogon caerulescens* | <1% | <1% |
| *Enneapogon polyphyllus* | <1% | <1% |
| *Eragrostis dielsii* | 2-5% | 2-5% |
| *Eremophea spinosa* | <1% | <1% |
| *Eremophila spongiocarpa* | 2-3% | 2% |
| *Flaveria trinervia* | <1% | - |
| *Goodenia forrestii* | <1% | <1% |
| Heliotropium chrysocarpum | <1% | <1% |
| *Lawrencia densiflora* | <1% | <1% |
| *Maireana luehmannii* | <1% | <1% |
| *Muellerolimon salicorniaceum* | 2% | <1%-1% |
| *Nicotiana heterantha* | 1% | 1-2% |
| *Pterocaulon sphacelatum* | <1% | <1% |
| *Ptilotus nobilis* subsp. *nobilis* | <1% | <1% |
| *Ptilotus obovatus* | <1% | <1% |
| *Salsola australis* | <1% | - |
| *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) | <1% | <1% |
| *Senna artemisioides* subsp. *oligophylla* | <1% | <1% |
| *Senna artemisioides* subsp. x artemisioides | <1% | <1% |
| *Sida fibulifera* | <1% | <1% |
| *Streptoglossa bubakii* | <1% | <1% |
| *Streptoglossa liatroides* | - | <1% |
| *Streptoglossa odora* | - | <1% |
| *Swainsona kingii* | <1% | <1% |
| *Tecticornia auriculata* | <1 | <1% |
| *Tecticornia indica* subsp. *bidens* | 45% | 45-50% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | 10% | 8-10% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | 5% | <1% |
| *Tragus australianus* | <1% | - |
| *Triodia longiceps* | 2-5% | 2-5% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT015

**Date established:** 8/08/2013**Date rescored:**15/07/2014

**Lat/Long (dd):**-22.55441791 °S 119.6377264°E

**MGA** **Zone 50** 771265.4391mE 7503408.504mN

**Location:** On southern margin of Fortescue Marsh, 25.2 km ENE of Marillana Homestead, 33.7 km WNW of Roy Hill Homestead, 22.7 km ESE of Paroo Well, 24 km S of Karntama Village (Christmas Creek Mine).

**Vegetation:** Sparse shrubland of *Melaleuca xerophila* over mid-dense shrubland of *Muellerolimon salicorniaceum*, *Tecticornia indica*, *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)& T. Colmer et al. KS 1063) and *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552), over very sparse herb and grass layer of *Eragrostis dielsii*, *Lawrencia*

**Site:** Margin of extensive saline flood plain and lake bed adjacent to calcrete plain with surface fragments of calcrete on deep (>0.5m), coffee to light red-brown, loamy sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Aerva javanica* | <1% | <1% |
| *Aristida contorta* | <1% | <1% |
| *Atriplex bunburyana* | <1% | <1% |
| *Atriplex codonocarpa* | <1% | - |
| *Cenchrus ciliaris* | <1% | <1% |
| *Dichanthium sericeum* subsp. *humilius* | <1% | - |
| *Dysphania plantaginella* | - | <1% |
| *Enchylaena tomentosa* var. *tomentosa* | - | <1% |
| *Enneapogon caerulescens* | <1% | <1% |
| *Eragrostis dielsii* | <1% | 1-2% |
| *Eremophea spinosa* | <1% | <1% |
| *Eremophila spongiocarpa* | <1% | <1% |
| *Gomphrena affinis* subsp. *pilbarensis* | <1% | - |
| *Goodenia forrestii* | <1% | - |
| *Lawrencia densiflora* | <1% | <1% |
| *Maireana luehmannii* | <1% | <1% |
| *Melaleuca xerophila* | 15% | 15 (20)% |
| *Muellerolimon salicorniaceum* | (2-)5-10% | 2-5% |
| *Nicotiana heterantha* | <1% | <1% |
| *Pterocaulon sphacelatum* | <1% | <1% |
| *Ptilotus nobilis* subsp. *nobilis* | <1% | <1% |
| *Salsola australis* | <1% | <1% |
| *Sida fibulifera* | <1% | <1% |
| *Solanum lasiophyllum* | <1% | <1% |
| *Sporobolus australasicus* | - | <1% |
| *Sporobolus mitchellii* | - | <1% |
| *Streptoglossa bubakii* | <1% | <1% |
| *Streptoglossa odora* | <1% | <1% |
| *Swainsona kingii* | <1% | <1% |
| *Tecticornia* sp. sterile | | |
| *Tecticornia auriculata* | <1% | <1% |
| *Tecticornia indica* subsp. *bidens* | 30% | 30% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | 8% | 1-2% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | 5% | 5-10% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT016

**Date established:** 9/08/2013**Date rescored:**18/06/2014

**Lat/Long (dd):**-22.47882513°S 119.4828104°E

**MGA** **Zone 50** 55465.5067mE 7512055.067mN

**Location:** On southern margin of Fortescue Marsh, 6.3 km ENE of Paroo Well, 18.8 km NNE of Marillana Homestead, 28 km SE of Minga Bore, 24.8 km SW of Karntama Village (Christmas Creek Mine).

NNW of Newman, Pilbara IBRA

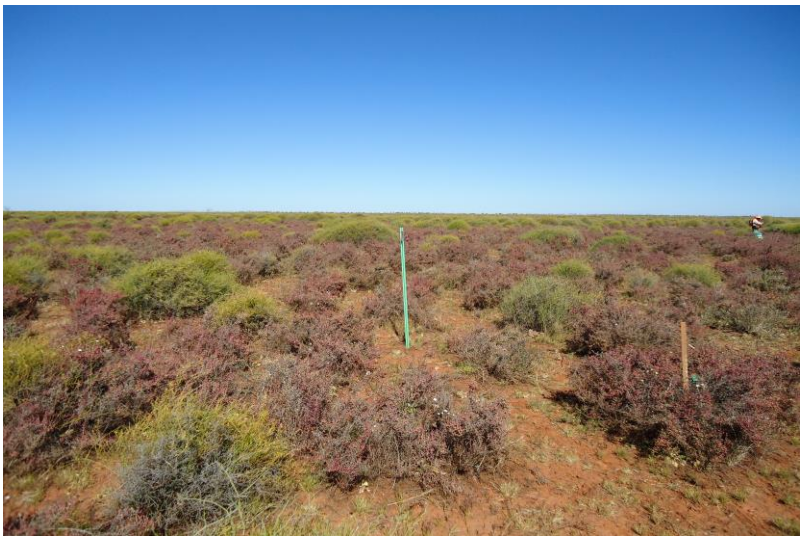
**Vegetation:** Very sparse tall shrubland of *Melaleuca xerophila* over mid-dense shrubland of *Muellerolimon salicorniaceum*, *Eremophila spongiocarpa*, *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)*Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) and *Tecticornia indica* subsp. *bidens*, over sparse grassland of Eregrostis dielsii.

**Site:** Margin of extensive saline flood plain and lake bed adjacent to calcrete plain with surface fragments of calcrete on shallow, red to coffee brown, loamy sand soils

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cenchrus ciliaris* | <1% | <1% |
| *Einadia nutans* subsp. *eremaea* | <1% | <1% |
| *Enchylaena tomentosa* var. *tomentosa* | <1% | <1% |
| *Enneapogon caerulescens* | <1% | - |
| *Eragrostis dielsii* | 20% | 20-25% |
| *Eremophea spinosa* | <1% | <1% |
| *Eremophila longifolia* | <1% | <1% |
| *Eremophila spongiocarpa* | 2% | 2% |
| *Flaveria trinervia* | - | <1% |
| *Frankenia ambita* | <1% | <1% |
| *Goodenia forrestii* | <1% | <1% |
| *Lawrencia densiflora* | <1% | <1% |
| *Maireana luehmannii* | <1% | <1% |
| *Melaleuca glomerata* | <1% | <1% |
| *Melaleuca xerophila* | 15% | 15% |
| *Muellerolimon salicorniaceum* | 10% | 10% |
| *Nicotiana heterantha* | <1% | <1% |
| *Pluchea dunlopii* | <1% | <1% |
| *Pluchea rubelliflora* | <1% | - |
| *Pterocaulon sphacelatum* | <1% | <1% |
| *Rhagodia eremaea* | <1% | - |
| *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) | <1% | <1% |
| *Solanum lasiophyllum* | <1% | <1% |
| *Swainsona kingii* | - | <1% |
| *Tecticornia indica* subsp. *bidens* | 5% | 5% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | 15% | 15% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | 15% | 10-15% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT017



**Date established:** 11/08/2013 **Date rescored:** 28/07/2014

**Lat/Long (dd):** -22.50823505°S 119.7793825°E

**MGA** **Zone 50** 785936.5363mE 7508260.421mN

**Location:** On NE margin of Fortescue Marsh, 1.2 km NE of Moorimordinia Pool and 10 km WNW of 14 Mile Pool, 22.2 km NW of Roy Hill Homestead, 21.7 km SSE of Karntama Village (Christmas Creek Mine).

**Vegetation:** Very sparse shrubland of *Muellerolimon salicorniaceum*, over mid-dense chenopod shrubland *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) over sparse groundcover of herbs and grasses of *Cullen cinereum*, *Eragrostis dielsii*, *Swainsona tanamiensis*, *Marsilea drummondii* and *Nicotiana heterantha*.

**Site:** Stony flats on margin of extensive flood plain and freshwater channel with surface fragments of BIF and other metasediments on deep (>0.5m), red-brown, silty loam soils

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Abutilon lepidum* | <1% | - |
| *Alternanthera denticulata* | <1% | <1% |
| *Alternanthera nodiflora* | <1% | <1% |
| *Brachyachne prostrata* | <1% | <1% |
| *Chloris pectinata* | <1% | <1% |
| *Cressa australis* | <1% | <1% |
| *Cullen cinereum* | <1% | <1% |
| *Cullen graveolens* | <1% | <1% |
| *Cyperus bulbosus* | - | <1% |
| *Enneapogon polyphyllus* | <1% | - |
| *Eragrostis dielsii* | 15% | 10-15% |
| *Eragrostis leptocarpa* | <1% | - |
| *Eriachne flaccida* | <1% | <1% |
| *Frankenia ambita* | <1% | - |
| *Gomphrena kanisii* | <1% | - |
| *Malvastrum americanum* | <1% | - |
| *Marsilea drummondii* | 1-2% | <1% |
| *Muellerolimon salicorniaceum* | 5-8%-(10%) | 5-8% |
| *Nicotiana heterantha* | <1% | 1-2% |
| *Panicum decompositum* | <1% | - |
| *Portulaca filifolia* | - | <1% |
| *Pterocaulon sphacelatum* | <1% | - |
| *Ptilotus gomphrenoides* | <1% | - |
| *Ptilotus nobilis subsp. nobilis* | <1% | - |
| *Salsola australis* | <1% | - |
| *Sida fibulifera* | | |
| *Solanum lasiophyllum* | <1% | - |
| *Sporobolus australasicus* | <1% | <1% |
| *Streptoglossa adscendens* | <1% | - |
| *Swainsona tanamiensis* | 1-2% | 2-5% |
| *Tecticornia auriculata* | <1% | <1% |
| *Tecticornia indica* subsp. *bidens* | <1% | <1% |
| *Tecticornia indica* subsp. *leiostachya* | <1% | <1% |
| *Tecticornia pergranulata* subsp. *pergranulata* | 8-10% | 8-10% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | 40% | 35% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | <1-1% | <1% |
| *Vachellia farnesiana* | <1% | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT018

**Date established:** 11/08/2013 **Date rescored:** 28/07/2014

**Lat/Long (dd):** -22.51198587 °S 119.7637176°E

**MGA** **Zone 50** 784316.391mE 7507874.77mN

**Location:** On NE margin of Fortescue Marsh. Along banks of channel associated with Moorimordinia Pool, 11.3 km WNW of 14 Mile Pool. 21.3 km SSE of Karntama Village (Christmas Creek Mine), 22 km WNW of Roy Hill summit.

**Vegetation:** Sparse shrubland of *Acacia ampliceps* over mid-dense shrubland of *Sesbania cannabina*, *Solanum nigrum* and *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702), over sparse herbfield of *Centipeda minima* subsp. *macrocephala*, *Centipeda crateriformis* subsp. *crateriformis*, *Helichrysum luteoalbum*, *Polygonum plebeium*and

**Site:** Embankment of permanent freshwater channel on saline flood plain with deep (>0.5m), red-brown , loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Acacia ampliceps* | 30% | 30% |
| *Alternanthera denticulata* | <1% | <1% |
| *Alternanthera nodiflora* | <1% | <1% |
| *Atriplex amnicola* | <1% | <1% |
| *Cenchrus ciliaris* | - | <1% |
| *Centipeda crateriformis* subsp. *crateriformis* | <1% | <1% |
| *Centipeda minima* subsp. *macrocephala* | 1-2% | 2-5% |
| *Cullen cinereum* | <1% | <1% |
| *Duma florulenta* | <1% | <1% |
| *Dysphania plantaginella* | - | <1% |
| *Eleocharis papillosa* | - | <1% |
| *Eragrostis dielsii* | <1% | <1% |
| *Eragrostis* tenellula | <1% | <1% |
| *Frankenia ambita* | <1% | <1% |
| *Helichrysum luteoalbum* | 1% | 2-5% |
| *Heliotropium curassavicum* | <1% | 1% |
| *Malvastrum americanum* | <1% | <1% |
| *Nicotiana heterantha* | <1% | 5% |
| *Polygonum plebeium* | <1% | 5-10% |
| *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) | 35% | 35% |
| *Sesbania cannabina* | 2% | <1% |
| *Solanum lasiophyllum* | <1% | - |
| *Solanum nigrum* | 5-10% | <1% |
| *Sonchus oleraceus* | <1% | <1% |
| *Sporobolus mitchellii* | <1% | <1% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | <1% | <1% |
| *Trigonella suavissima* | <1% | <1% |
| *Vachellia farnesiana* | <1% | <1% |

## Site FORT019

**Date established:** 11/08/2013 **Date rescored:** 28/07/2014

**Lat/Long (dd):** -22.50905187°S 119.7660764°E

**MGA** **Zone 50** 784565.2014mE 7508195.323mN

**Location:** On NE margin of Fortescue Marsh, 1.1 km NW of Moorimordinia Pool and 11.2 km WNW of 14 Mile Pool, 21.1 km SSE of Karntama Village (Christmas Creek Mine), 21.9 km WNW of Roy Hill summit.

**Vegetation:** Mid-dense shrubland of *Muellerolimon salicorniaceum*, over isolated plants of *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)over very sparse groundcover of *Eragrostis dielsii*and *Marsilea drummondii*.

**Site:** Margin of extensive saline flood plain and near permanent freshwater channel with surface fragments of BIF on deep (>0.5m), red-brown, silty loam soils

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Alternanthera nodiflora* | <1% | 2% |
| *Centipeda minima* subsp. *macrocephala* | <1% | - |
| *Cyperus bulbosus* | - | 1-2% |
| *Eragrostis dielsii* | 1-2% | 2% |
| *Marsilea drummondii* | 1-2% | <1% |
| *Muellerolimon salicorniaceum* | 60-65% | 60-65% |
| *Nicotiana heterantha* | <1% | <1% |
| *Swainsona tanamiensis* | <1% | 1% |
| *Tecticornia auriculata* | <1% | <1% |
| *Tecticornia indica* subsp. *bidens* | <1% | <1% |
| *Tecticornia indica* subsp. *leiostachya* | <1% | <1% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | 1-2% | 1-2% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | <1% | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT020

**Date established:** 12/08/2013 **Date rescored:** 27/06/2014

**Lat/Long (dd):** -22.56798042°S 119.923505°E

**MGA** **Zone 50** 800642.885mE 7501357.997mN

**Location:** On E side of Fortescue Marsh, 6.4 km ESE of 14 Mile Pool, 5 km NW of Roy Hill summit, 36.2 km SE of Karntama Village (Christmas Creek Mine), 11.3 km NNW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Sparse *Tecticornia auriculata* chenopod shrubland over very sparse chenopod shrubland of *Tecticornia indica* subsp.*bidens*, *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) and *Tecticornia indica* subsp. *leiostachya* over very sparse ground cover of *Eragrostis dielsii*, *Nicotiana heterantha*, *Cullen cinereum*, *Portulaca oleracea* and

**Site:** Alluvial flats near freshwater river and margin of extensive flood plain with surface fragments of BIF and other metasediments on deep (>0.5m), red-brown , silty clay loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Alternanthera nodiflora* | <1% | <1% |
| *Atriplex amnicola* | <1% | <1% |
| *Brachyachne prostrata* | <1% | - |
| *Chloris pectinata* | <1% | 1% |
| *Cullen cinereum* | <1% | <1% |
| *Cyperus bulbosus* | - | <1% |
| *Cyperus rigidellus* | <1% | - |
| *Dactyloctenium radulans* | <1% | |
| *Echinochloa colona* | <1% | <1% |
| *Eragrostis dielsii* | <1% | 10-15% |
| *Eremophila spongiocarpa* | <1% | <1% |
| *Eriochloa pseudoacrotricha* | <1% | <1% |
| *Malvastrum americanum* | <1% | - |
| *Marsilea exarata* | <1% | <1% |
| *Marsilea hirsuta* | <1% | <1% |
| *Neptunia dimorphantha* | <1% | - |
| *Nicotiana heterantha* | <1% | - |
| *Panicum decompositum* | <1% | <1% |
| *Portulaca oleracea* | <1% | <1% |
| *Ptilotus gomphrenoides* | <1% | <1% |
| *Ptilotus nobilis* subsp. *nobilis* | <1% | - |
| *Streptoglossa adscendens* | <1% | <1% |
| *Tecticornia auriculata* | 25-30% | 25-30% |
| *Tecticornia globulifera* | <1% | <1% |
| *Tecticornia indica* subsp. *bidens* | 5% | 5% |
| *Tecticornia indica* subsp. *leiostachya* | 5% | 5% |
| *Tecticornia pergranulata* subsp. *pergranulata* | <1% | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | <1% | <1% |
| *Trianthema* aff. *triquetrum* | <1% | <1% |
| *Trianthema triquetrum* | <1% | <1% |
| *Vachellia farnesiana* | <1% | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT021

**Date established:** 12/08/2013 **Date rescored:**27/06/2014

**Lat/Long (dd):** -22.56624922°S 119.9264277°E

**MGA** **Zone 50** 800947.4009mE 7501543.91mN

**Location:** On NE side of Fortescue Marsh, 6.6 km ESE of 14 Mile Pool 4.9 km NW of Roy Hill summit, 36.2 km SE of Karntama Village (Christmas Creek Mine), 11.4 km N of Roy Hill-Munjina and Marble Bar Rd intersection.

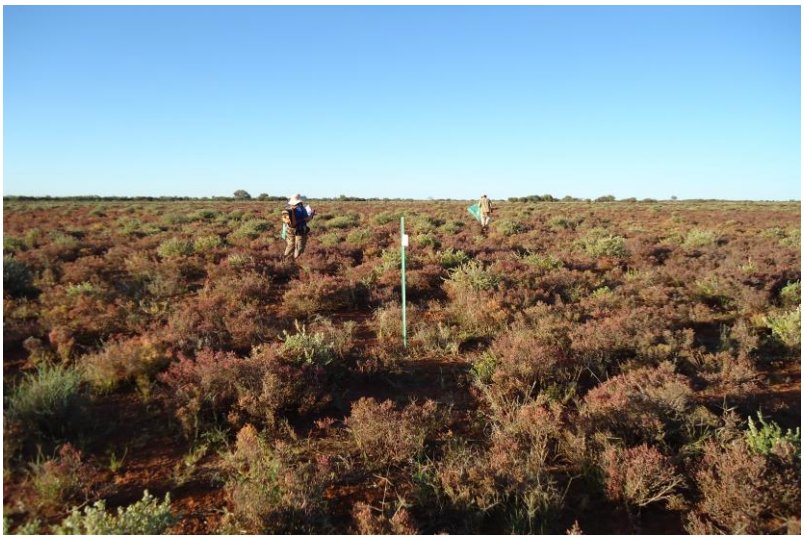
**Vegetation:** Very sparse shrubland of *Vachellia farnesiana* over mid-dense shrubland of *Atriplex amnicola*, *Eremophila spongiocarpa*, *Tecticornia indica* subsp. *bidens*, over mid-dense grass and herb cover of *Eragrostis leptocarpa*, *Eriochloa pseudoacrotricha*, *Chloris pectinata*, *Cullen cinereum*, *Marsilea exarata* and *Alternanthera denticulata*.

**Site:** Alluvial flats near freshwater river and margin of extensive flood plain with surface fragments of BIF and other metasediments on deep (>0.5m), red-brown , silty clay loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Acacia* coriacea subsp. pendens | <1% | <1% |
| *Acacia synchronicia* | <1% | <1% |
| *Alternanthera denticulata* | <1% | <1% |
| *Alternanthera nodiflora* | <1% | - |
| *Atriplex amnicola* | 30% | 30% |
| *Calotis hispidula* | <1% | - |
| *Cenchrus ciliaris* | <1% | <1% |
| *Chloris pectinata* | 2% | 2-5% |
| *Cullen cinereum* | 2-5% | <1% |
| *Cyperus rigidellus* | <1% | - |
| *Dactyloctenium radulans* | - | <1% |
| *Dichanthium sericeum* subsp. *humilius* | <1% | <1% |
| *Duma florulenta* | <1% | <1% |
| *Echinochloa colona* | <1% | <1% |
| *Enteropogon ramosus* | - | <1% |
| *Eragrostis dielsii* | <1% | <1% |
| *Eragrostis leptocarpa* | 10% | 1% |
| *Eremophila spongiocarpa* | 15% | 15% |
| *Eriochloa pseudoacrotricha* | 15-20% | 55-60% |
| *Malvastrum americanum* | <1% | <1% |
| *Marsilea exarata* | <1% | <1% |
| *Minuria integerrima* | <1% | - |
| *Neptunia dimorphantha* | <1% | <1% |
| *Nicotiana heterantha* | <1% | - |
| *Panicum decompositum* | <1% | <1% |
| *Paspalidium aff. jubiflorum* | <1% | <1% |
| *Phyllanthus maderaspatensis* | <1% | - |
| *Portulaca oleracea* | <1% | - |
| *Ptilotus gomphrenoides* | <1% | <1% |
| *Rhynchosia australis* | <1% | <1% |
| *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) | <1% | <1% |
| *Sclerolaena cuneata* | <1% | <1% |
| *Sclerolaena diacantha* | - | <1% |
| *Sida fibulifera* | <1% | <1% |
| *Sida trichopoda* | <1% | - |
| *Streptoglossa adscendens* | <1% | - |
| *Streptoglossa bubakii* | <1% | - |
| *Tecticornia auriculata* | <1% | <1% |
| *Tecticornia indica* subsp. *bidens* | 2% | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | <1% | <1% |
| *Trianthema* aff. *triquetrum* | <1% | <1% |
| *Vachellia farnesiana* | 10-15% | 10-15% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT022



**Date established:** 12/08/2013 **Date rescored:** 2/08/2014

**Lat/Long (dd):**-22.50202565°S 119.7779024°E

**MGA** **Zone 50** 785796.9604mE 7508951.163mN

**Location:** On NE side of Fortescue Marsh, 1.7 km NNE of Moorimordinia Pool and 10.5 km WNW of 14 Mile Pool, 21 km SSE of Karntama Village (Christmas Creek Mine), 21.3 km WNW of Roy Hill summit, 25.3 km NW of Roy Hill-Munjina and Marble Bar Rd intersection.

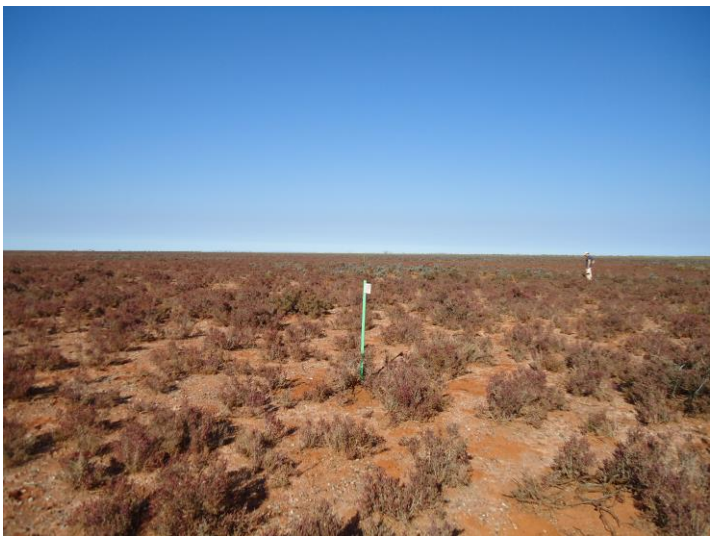
**Vegetation:** Sparse shrubland of *Eremophila spongiocarpa* over mid-dense shrubland of *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) and *Tecticornia indica* subsp. *bidens*, over sparse cover of *Swainsona kingii*, *Eragrostis dielsii*, *Eragrostis leptocarpa* and *Sida fibulifera*.

**Site:** Stony flats on margin of extensive flood plain and freshwater channel with surface fragments of BIF and other metasediments on deep (>0.5m), red-brown, loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Abutilon* oxycarpum subsp. Prostrate (A.A. Mitchell PRP 1266) . | <1% | - |
| *Aristida contorta* | <1% | <1% |
| *Boerhavia* cf. *coccinea* | - | <1% |
| *Calocephalus beardii* | <1% | - |
| *Calotis hispidula* | <1% | - |
| *Calotis plumulifera* | <1% | - |
| Calotis squamigera | <1% | - |
| *Cenchrus ciliaris* | <1% | <1% |
| Cenchrus setiger | <1% | <1% |
| Chloris cf. pectinata | <1% | <1% |
| *Chloris pectinata* | <1% | <1% |
| *Dactyloctenium radulans* | - | <1% |
| *Dysphania plantaginella* | - | <1% |
| *Enneapogon caerulescens* | <1% | <1% |
| *Enneapogon polyphyllus* | <1% | <1% |
| *Eragrostis dielsii* | 5% | 2-5% |
| *Eragrostis leptocarpa* | <1% | <1% |
| *Eragrostis xerophila* | <1% | <1% |
| *Eremophila spongiocarpa* | 8-10% | 10% |
| *Euphorbia boophthona* | <1% | - |
| *Evolvulus alsinoides* var. *villosicalyx* | <1% | <1% |
| *Goodenia forrestii* | <1% | <1% |
| *Ipomoea coptica* | - | <1% |
| *Maireana amoena* | - | <1% |
| *Malvastrum americanum* | <1% | - |
| *Neptunia dimorphantha* | <1% | <1% |
| *Nicotiana heterantha* | <1% | <1% |
| *Nicotiana heterantha* | <1% | <1% |
| *Portulaca filifolia* | <1% | <1% |
| *Portulaca intraterranea* | <1% | <1% |
| *Portulaca oleracea* | <1% | <1% |
| *Pterocaulon sphacelatum* | <1% | - |
| *Rhynchosia australis* | <1% | <1% |
| *Sclerolaena cuneata* | <1% | <1% |
| *Sclerolaena densiflora* | <1% | - |
| *Sclerolaena* recurvicuspis | <1% | <1% |
| *Sida fibulifera* | 1% | <1% |
| Solanum c.f. lasiophyllum | <1% | <1% |
| *Sporobolus australasicus* | <1% | <1% |
| *Sporobolus mitchellii* | <1% | <1% |
| *Swainsona kingii* | <1% | <1% |
| Swainsona leeana | <1% | - |
| *Tecticornia indica* subsp. *bidens* | 30-35% M | 30-35% M |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | <1% | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | 8-10% V | 8-10% V |
| *Trianthema triquetrum* | <1% | <1% |
| *Triraphis mollis* | - | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT023



**Date established:** 13/08/2013 **Date rescored:**28/06/2014

**Lat/Long (dd):**-22.50850721 119.7840987°E

**MGA** **Zone 50** 7508221.239Nm 786421.4344mE

**Location:** On NE side of Fortescue Marsh, 1.9 km ENE of Moorimordinia Pool and 9.1 km WNW of 14 Mile Pool, 21.9 km SSE of Karntama Village (Christmas Creek Mine), 19.9 km WNW of Roy Hill summit, 24 km NW of Roy Hill-Munjina and Marble Bar Rd.

**Vegetation:** Mid-dense chenopod shrubland of *Tecticornia indica* subsp. *bidens*, *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) and *Tecticornia auriculata* over very sparse grassland of *Eragrostis dielsii*, *Portulaca pilosa*, *Portulaca intraterranea* and *Enneapogon caerulescens*.

**Site:** Stony flats on margin of extensive flood plain and freshwater channel with surface fragments of BIF, quartz and other metasediments on shallow, red-brown , loamy sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Aerva javanica* | - | <1% |
| *Aristida contorta* | <1% | - |
| *Boerhavia coccinea* | - | <1% |
| *Calocephalus beardii* | <1% | - |
| *Cenchrus ciliaris* | <1% | <1% |
| *Chloris pectinata* | <1% | <1% |
| *Chloris virgata* | <1% | <1% I |
| *Cyperus bulbosus* | - | <1% |
| *Dactyloctenium radulans* | - | <1% |
| *Dysphania plantaginella* | - | <1% |
| *Enneapogon caerulescens* | <1% | <1% |
| *Enneapogon polyphyllus* | <1% | <1% |
| *Eragrostis dielsii* | 1-2% V | 1-2% V |
| *Eragrostis leptocarpa* | <1% | <1% |
| *Eremophila spongiocarpa* | <1% | <1% |
| *Maireana luehmannii* | <1% | <1% |
| *Muellerolimon salicorniaceum* | <1% | <1% |
| *Neptunia dimorphantha* | <1% | |
| *Nicotiana heterantha* | <1% | - |
| *Portulaca filifolia* | <1% | <1% |
| *Portulaca intraterranea* | <1% | <1% |
| *Sclerolaena cuneata* | <1% | <1% |
| *Sclerolaena lanicuspis* | <1% | <1% |
| *Sida fibulifera* | <1% | - |
| *Sporobolus australasicus* | <1% | <1% |
| *Swainsona kingii* | <1% | <1% |
| *Tecticornia auriculata* | 1-2% V | 1-2% V |
| *Tecticornia indica* subsp. *bidens* | 35% M | 35% M |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | <1% | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | <1% | <1% |
| *Tragus australianus* | <1% | - |
| *Trianthema* aff. *triquetrum* | <1% | <1% |
| *Trianthema triquetrum* | <1% | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT024

**Date established:** 1313/08/2013 **Date rescored:** 29/06/2014

**Lat/Long (dd):**-22.50872766°S 119.7889429°E

**MGA** **Zone 50** 786919.6228mE 7508187.525mN

**Location:** On NE side of Fortescue Marsh, 1.5 km NE of Moorimordinia Pool, 9.6 km WNW of 14 Mile Pool, 22.2 km SSE of Karntama Village (Christmas Creek Mine), 20.4 km WNW of Roy Hill summit, 24.4 km NW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Very sparse shrubland of *Eremophila youngii* subsp. *lepidota* over sparse shrubland of *Frankenia setosa*, *Maireana carnosa*, *Maireana eriosphaera*, *Sclerolaena lanicuspis*, *Sclerolaena cuneata* over very sparse herbs and grasses of *Brachyachne prostrata*, *Xerochloa barbata*, *Portulaca* spp., *Sclerolaena lanicuspis*, *Eragrostis dielsii*, *Eragrostis leptocarpa* and *Tragus australianus*.

**Site:** Stony plains subject to sheet flow, near extensive saline flood plain with surface fragments of BIF and other metasediments on shallow, red-brown, loamy sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Acacia tetragonophylla* | <1% | <1% |
| *Aristida contorta* | <1% | <1% |
| *Atriplex bunburyana* | <1% | <1% |
| *Atriplex codonocarpa* | <1% | <1% |
| *Boerhavia coccinea* | - | <1% |
| *Brachyachne prostrata* | <1% | <1% |
| *Calandrinia ptychosperma* | <1% | - |
| *Calocephalus beardii* | <1% | - |
| *Chloris pumilio* | <1% | <1% |
| *Dactyloctenium radulans* | <1% | <1% |
| *Enchylaena tomentosa* var. *tomentosa* | <1% | <1% |
| *Enteropogon ramosus* | <1% | <1% |
| *Eragrostis ? xerophila* | | |
| *Eragrostis crateriformis* | <1% | <1% |
| *Eragrostis dielsii* | <1% | <1% |
| *Eragrostis leptocarpa* | <1% | <1% |
| *Eragrostis* setifolia | | |
| *Eremophila spongiocarpa* | <1% | <1% |
| *Eremophila youngii* subsp. *lepidota* | 15-20% | 15-20% |
| *Frankenia setosa* | 10-15% S | 10-15% S |
| *Gnephosis brevifolia* | <1% | - |
| *Lepidium platypetalum* | <1% | <1% |
| *Maireana carnosa* | <1% | <1% |
| *Maireana eriosphaera* | 1% | 1-2% |
| *Maireana* platycarpa | <1% | <1% |
| *Maireana pyramidata* | <1% | <1% |
| *Portulaca intraterranea* | <1% | <1% |
| *Portulaca oleracea* | <1% | <1% |
| *Rhagodia eremaea* | <1% | <1% |
| *Salsola australis* | <1% | <1% |
| *Sclerolaena* aff. *densiflora* | <1% | <1% |
| *Sclerolaena cuneata* | 2-3% | 1-2% |
| *Sclerolaena lanicuspis* | <1% | <1% |
| *Senna artemisioides* subsp. *oligophylla* | <1% | <1% |
| *Sida fibulifera* | <1% | - |
| *Tragus australianus* | <1% | - |
| *Trianthema triquetrum* | <1% | <1% |
| *Xerochloa barbata* | <1% | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT025

**Date established:** 28/08/2013 **Date rescored:** 29/06/2014

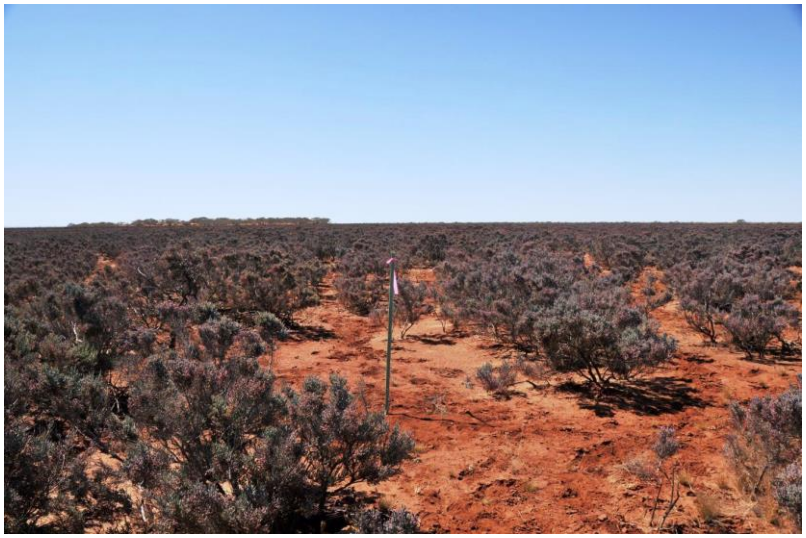
**Lat/Long (dd):** -22.61220552°S 119.8070083°E

**MGA** **Zone 50** 788563.5507mE 7496688.623 mN

**Location:** On SE side of Fortescue Marsh, 8.7 km SW of 14 Mile Pool, 15.2 km W of Roy Hill summit, 33.2 km SSE of Karntama Village (Christmas Creek Mine), 15.7 km WNW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Mid-dense shrubland of *Tecticornia auriculata* over sparse grassland of *Eragrostis dielsii*.

**Site:** Extensive saline flood plain and lake bed with deep (>0.5m), red-brown, loamy sand soils.



| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cullen cinereum* | <1% | <1% |
| *Cyperus bulbosus* | - | 2-5% |
| *Eragrostis dielsii* | 30-40% | 25-30% |
| *Maireana luehmannii* | <1% | - |
| *Portulaca oleracea* | - | <1% |
| *Sporobolus australasicus* | <1% | <1% |
| *Streptoglossa bubakii* | <1% | - |
| *Swainsona tanamiensis* | <1% | 2% |
| *Tecticornia auriculata* | 40-45% | 40-45% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | <1% | <1% |
| *Trianthema triquetrum* | - | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT026

**Date established:** 28/08/2013 **Date rescored:** 25/06/2014

**Lat/Long (dd):** -22.54990635°S 119.7980385

**MGA** **Zone 50** 787770.455 mE 7503607.968 mN

**Location:** On SE side of Fortescue Marsh, 4.5 km SE of Moorimordinia Pool, 6.7 km W of 14 Mile Pool, 17.1 km WNW of Roy Hill summit, 26.6 km SSE of Karntama Village (Christmas Creek Mine), 20.2 km NW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Mid-dense shrubland of *Muellerolimon salicorniaceum*, over sparse shrubland of *Tecticornia indica* subsp. *bidens*, over very sparse - isolated forbs of *Cressa australis*, *Nicotiana heterantha*, *Alternanthera nodiflora* and *Heliotropium curassavicum*.

**Site:** Margin of extensive saline flood plain and lake bed with deep (>0.5m), red-brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Alternanthera nodiflora* | <1% | 1% |
| *Centipeda crateriformis* subsp. *crateriformis* | <1% | <1% |
| *Centipeda minima* subsp. *macrocephala* | <1% | <1% |
| *Cressa australis* | <1% | <1% |
| *Cyperus bulbosus* | - | <1% |
| *Eragrostis dielsii* | <1% | <1% |
| *Heliotropium curassavicum* | <1% | 1% |
| *Marsilea drummondii* | <1% | <1% |
| *Mimulus* aff *gracilis* | - | <1% |
| *Muellerolimon salicorniaceum* | 40-45% | 40-45% |
| *Nicotiana heterantha* | <1% | <1% |
| *Peplidium* sp. E Evol. Fl. Fauna Arid Aust. (A.S. Weston 12768) | <1% | <1% |
| *Pluchea rubelliflora* | <1% | - |
| *Swainsona tanamiensis* | <1% | <1% |
| *Tecticornia auriculata* | <1% | <1% |
| *Tecticornia medusa* | <1% | <1% |
| *Tecticornia pergranulata* subsp. *pergranulata* | 15-20% | 15-20% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT027

**Date established:** 28/08/2013 **Date rescored:** 25/06/2014

**Lat/Long (dd):** -22.54670103°S 119.79901794°E

**MGA** **Zone 50** 787877.9001 mE 7503961.187 mN

**Location:** On SE side of Fortescue Marsh, 4.2 km SE of Moorimordinia Pool, 6.7 km W of 14 Mile Pool, 17.1 km WNW of Roy Hill summit, 26.4 km SSE of Karntama Village (Christmas Creek Mine), 20.3 km NW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Mid-dense shrubland of *Tecticornia pergranulata* subsp. *pergranulata*, over sparse cover of *Marsilea drummondii* and *Cressa australis*.

**Site:** Ephemeral drainage and lake bed in middle of extensive saline flood plain with deep (>0.5m), red-brown , silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Alternanthera nodiflora* | <1% | <1% |
| *Cressa australis* | 1-2% | <1% |
| *Eleocharis papillosa* | - | 2-5% |
| *Heliotropium curassavicum* | <1% | <1% |
| *Marsilea drummondii* | 5%* | 1% |
| *Mimulus* aff *gracilis* | <1% | <1% |
| *Muellerolimon salicorniaceum* | <1% | <1% |
| *Nicotiana heterantha* | <1% | <1% |
| *Peplidium* sp. E Evol. Fl. Fauna Arid Aust. (A.S. Weston 12768) | - | <1% |
| *Tecticornia medusa* | <1% | <1% |
| *Tecticornia pergranulata* subsp. *pergranulata* | 35-40% | 35-40% |

* up to 80% cover in previous month

## Site FORT028

**Date established:** 29/08/2013 **Date rescored:** 25/06/2014

**Lat/Long (dd):** -22.54806577°S 119.80361475°E

**MGA Zone 50** 788348.1091 mE7503801.116 mN

**Location:** On SE side of Fortescue Marsh, 4.7 km SE of Moorimordinia Pool, 6.2 km W of 14 Mile Pool, 16.6 km WNW of Roy Hill, 26.7 km SSE of Karntama Village (Christmas Creek Mine), 19.9 km NW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Sparse low shrubland of *Tecticornia pergranulata* subsp. *pergranulata* over sparse cover of *Heliotropium curassavicum*, *Tecticornia pergranulata* subsp. *pergranulata* seedlings and *Mimulus* aff. *gracilis*.

**Site:** Claypan associated with drainage and lake bed in middle of extensive saline flood plain with surface fragments of shell and BIF on deep (>0.5m), red-brown, silty clay loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Alternanthera nodiflora* | <1% | - |
| *Atriplex flabelliformis* | <1% | <1% |
| *Cressa australis* | <1% | <1% |
| *Eragrostis dielsii* | <1% | - |
| *Frankenia ambita* | <1% | - |
| *Heliotropium curassavicum* | 25-30% | 1-2% |
| *Marsilea drummondii* | <1% | <1% |
| *Mimulus* aff *gracilis* | 5-8% | 10-12% |
| *Muellerolimon salicorniaceum* | <1% | <1% |
| *Nicotiana heterantha* | <1% | <1% |
| *Peplidium* sp. E Evol. Fl. Fauna Arid Aust. (A.S. Weston 12768) | <1% | <1% |
| *Tecticornia* sp. sterile | | |
| *Tecticornia* sp. sterile | | |
| *Tecticornia medusa* | <1% | <1% |
| *Tecticornia pergranulata* subsp. *pergranulata* | 15-20% | 15-20% |
| *Trigonella suavissima* | <1% | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT029

**Date established:** 29/08/2013 **Date rescored:**25/06/2014

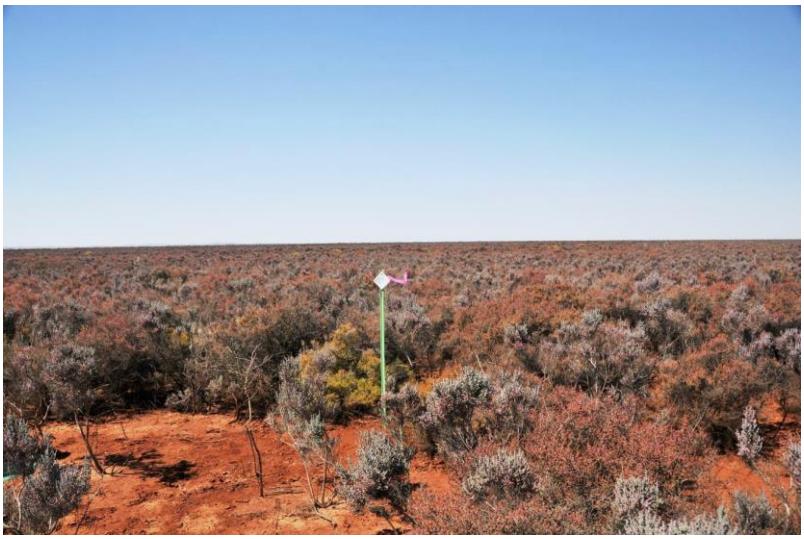
**Lat/Long (dd):**-22.55616931°S 119.79507275°E

**MGA Zone 50** 787452.269 mE 7502919.829 mN

**Location:** On SE margin of Fortescue Marsh, 4.9 km SSE of Moorimordinia Pool, 7 km W of 14 Mile Pool, 17.2 km WNW of Roy Hill summit, 27.1 km SSE of Karntama Village (Christmas Creek Mine), 20 km NW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Mid-dense *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)*Tecticornia auriculata*and *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) shrubland over isolated plants of *Cressa australis*.

**Site:** Margin of extensive saline flood plain and lake bed with surface fragments of calcrete on deep (>0.5m), red-brown, loamy sand soils.



| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cressa australis* | <1% | <1% |
| *Cullen cinereum* | - | <1% |
| *Cyperus bulbosus* | <1% | 1-2% |
| *Lawrencia* glomerata | <1% | <1% |
| *Muellerolimon salicorniaceum* | 1-2% | 1-2% |
| *Swainsona tanamiensis* | <1% | <1% |
| *Tecticornia auriculata* | 40% | 40% |
| *Tecticornia indica* subsp. *bidens* | <1% | <1% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | 35-40% | 35-40% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | 1% | 1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT030

**Date established:** 29/08/2013 **Date rescored:** 26/06/2014

**Lat/Long (dd):**-22.56957072°S 119.78781134°E

**MGA Zone 50** 7501449.105 mN786677.3275 mE

**Location:** On SE margin of Fortescue Marsh, 6 km SSE of Moorimordinia Pool, 8 km WSW of 14 Mile Pool, 17.5 km WNW of Roy Hill summit, 28.1 km SSE of Karntama Village (Christmas Creek Mine), 19.7 km WNW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Sparse shrubland of *Acacia sclerosperma* subsp. *sclerosperma* and *Melaleuca glomerata* over dense hummock grassland of *Triodia longiceps*

**Site:** Extensive, flat calcrete plain with surface fragments of calcrete. Very slightly rocky calcrete outcrop with shallow, red-brown - pale red, loamy sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Abutilon lepidum* | <1% | <1% |
| *Abutilon* sp. Pilbara (W.R. Barker 2025) | <1% | <1% |
| *Acacia sclerosperma* subsp. *sclerosperma* | 8% | 8% |
| *Acacia synchronicia* | <1% | <1% |
| *Aristida contorta* | - | <1% |
| *Cenchrus ciliaris* | 2-3% | 2-3% |
| *Corchorus sidoides* subsp. *sidoides* | <1% | <1% |
| *Enchylaena tomentosa* var. *tomentosa* | <1% | <1% |
| *Enneapogon polyphyllus* | <1% | <1% |
| *Euphorbia biconvexa* | - | <1% |
| *Euphorbia tannensis* subsp. *eremophila* | <1% | <1% |
| *Euphorbia vaccaria* var. *erucoides* | - | <1% |
| *Evolvulus alsinoides* var. *villosicalyx* | <1% | - |
| *Goodenia forrestii* | <1% | <1% |
| *Heliotropium glanduliferum* | <1% | <1% |
| *Indigofera linifolia* | <1% | <1% |
| *Indigofera monophylla* | <1% | <1% |
| *Malvastrum americanum* | <1% | <1% |
| *Melaleuca glomerata* | 2-3% | 2-3% |
| *Melhania oblongifolia* | <1% | <1% |
| *Pterocaulon sphacelatum* | <1% | <1% |
| *Ptilotus obovatus* | <1% | <1% |
| *Rhynchosia australis* | <1% | <1% |
| *Scaevola spinescens* | <1% | <1% |
| *Sida fibulifera* | <1% | <1% |
| *Solanum lasiophyllum* | <1% | <1% |
| *Stackhousia muricata* | - | <1% |
| *Triodia longiceps* | 65-70% | 65-70% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT031

**Date established:** 30/08/2013 **Date rescored:** 26/06/2014

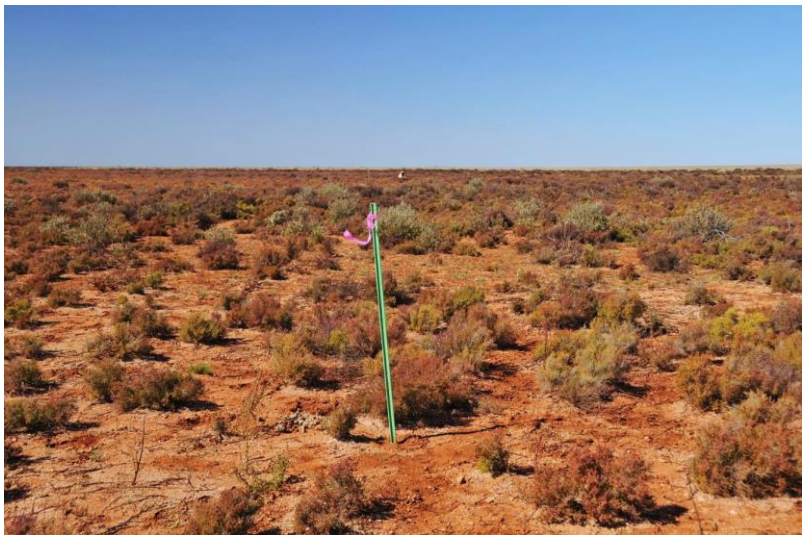
**Lat/Long (dd):** -22.55797486°S 119.7911915°E

**MGA Zone 50** 787049.1469 mE 7502727.272 mN

**Location:** On SE margin of Fortescue Marsh, 17.5 km WNW of Roy Hill summit, 4.9 km SSE of Moorimordinia Pool, 7.5 km W of 14 Mile Pool, 18.5 km WNW of Roy Hill Homestead, 27.1 km SSE of Karntama Village (Christmas Creek Mine), 20.2 km NW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Isolated plants of *Eremophila spongiocarpa* and *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)& T. Colmer et al. KS 1063) over mid-dense shrubland of *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) and *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)over isolated plants of *Eragrostis dielsii*.,

**Site:** Stony plains on margin of extensive saline flood plain and lake bed with surface fragments of calcrete on deep (>0.5m), red-brown , silty loam soils



| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Abutilon* malvifolium | <1% | <1% |
| *Aristida contorta* | <1% | - |
| *Brachyachne prostrata* | - | <1% |
| *Chloris pectinata* | <1% | <1% |
| *Convolvulus clementii* | <1% | <1% |
| *Cressa australis* | <1% | <1% |
| *Cullen cinereum* | <1% | <1% |
| *Cyperus bulbosus* | - | 1% |
| *Dactyloctenium radulans* | - | <1% |
| *Dichanthium sericeum* subsp. *humilius* | - | <1% |
| *Enneapogon caerulescens* | <1% | <1% |
| *Enneapogon polyphyllus* | <1% | <1% |
| *Eragrostis dielsii* | 1% | <1% |
| *Eragrostis leptocarpa* | - | <1% |
| *Eremophila spongiocarpa* | 1% | 1% |
| *Flaveria trinervia* | - | <1% |
| *Gomphrena affinis* subsp. *pilbarensis* | - | <1% |
| Iseilema vaginiflorum | - | <1% |
| *Lawrencia densiflora* | - | <1% |
| *Lawrencia* glomerata | <1% | <1% |
| *Lotus cruentus* | <1% | <1% |
| *Maireana amoena* | <1% | - |
| *Maireana luehmannii* | <1% | <1% |
| *Malvastrum americanum* | <1% | <1% |
| *Muellerolimon salicorniaceum* | <1% | <1% |
| *Nicotiana heterantha* | <1% | <1% |
| *Panicum decompositum* | - | <1% |
| *Pterocaulon sphacelatum* | <1% | - |
| *Sida fibulifera* | <1% | <1% |
| *Sida* sp. Rabbit Flat (B.J. Carter 626) | <1% | <1% |
| *Sida trichopoda* | <1% | <1% |
| *Solanum cleistogamum* | <1% | <1% |
| *Solanum lasiophyllum* | <1% | <1% |
| *Solanum morrisonii* | <1% | <1% |
| *Sporobolus australasicus* | <1% | <1% |
| *Streptoglossa bubakii* | <1% | <1% |
| *Streptoglossa liatroides* | <1% | <1% |
| *Swainsona kingii* | <1% | <1% |
| Swainsona leeana | <1% | - |
| *Swainsona tanamiensis* | <1% | <1% |
| *Tecticornia auriculata* | <1% | <1% |
| *Tecticornia indica* subsp. *bidens* | <1% | <1% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | 8-10% | 8-10% |
| *Zygophyllum eichleri* | <1% | - |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT032

**Date established:** 30/08/2013 **Date rescored:** 26/06/2014

**Lat/Long (dd):** -22.59973593°S 119.77432067°E

**MGA Zone 50** 785227.0824 mE 7498133.098 mN

**Location:** On SE margin of Fortescue Marsh, 9.2 km S of Moorimordinia Pool, 10.5 km WSW of 14 Mile Pool, 18.5 km W of Roy Hill summit, 30.6 km SSE of Karntama Village (Christmas Creek Mine), 19.4 km WNW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Sparse shrubland of *Melaleuca glomerata*, *Grevillea juncifolia* subsp. *juncifolia*, *Acacia dictyophleba* and occasional mallee of *Eucalyptus* rowleyi over mid-dense grassland of *Triodia schinzii*, *Eragrostis eriopoda*, *Aristida holathera* var. *holathera* and shrubs of *Sida cardiophylla*, *Ptilotus axillaris* and *Dicrastylis cordifolia*.

**Site:** 5-6 m tall, EW trending aeolian sand dune on calcrete plain, near margin of saline flood plain. No dominant aspect. Deep (>0.5m), red-brown, sandy soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Abutilon leucopetalum* | <1% | <1% |
| *Acacia dictyophleba* | <1% | <1% |
| *Acacia sclerosperma* subsp. *sclerosperma* | <1% | <1% |
| *Aristida holathera* var. *holathera* | 1% | <1% |
| *Boerhavia coccinea* | - | <1% |
| *Cenchrus ciliaris* | <1% | <1% |
| *Cleome viscosa* | 2% | <1% |
| *Corchorus sidoides* subsp. *sidoides* | <1% | <1% |
| Dicrastylis cordifolia | <1% | <1% |
| *Dysphania rhadinostachya* subsp. *rhadinostachya* | <1% | - |
| *Enchylaena tomentosa* var. *tomentosa* | <1% | - |
| *Eragrostis eriopoda* | 2-3% | 2-3% |
| *Eremophila longifolia* | <1% | <1% |
| *Eriachne helmsii* | <1% | <1% |
| *Eucalyptus rowleyi* | <1% | <1% |
| *Grevillea juncifolia* subsp. *juncifolia* | 1% | 1% |
| *Hibiscus brachychlaenus* | <1% | <1% |
| *Melaleuca glomerata* | 5% | 5% |
| *Paractaenum refractum* | <1% | <1% |
| *Paraneurachne muelleri* | <1% | <1% |
| *Paspalidium reflexum* | <1% | <1% |
| *Ptilotus astrolasius* | 2-5% | 2-5% |
| *Ptilotus axillaris* | <1% | - |
| *Ptilotus latifolius* | <1% | <1% |
| *Ptilotus polystachyus* | <1% | <1% |
| *Rhagodia eremaea* | <1% | <1% |
| *Salsola australis* | 1% | <1% |
| *Scaevola parvifolia* subsp. *pilbarae* | <1% | <1% |
| *Senna notabilis* | <1% | - |
| *Sida cardiophylla* | <1% | <1% |
| *Sida* sp. B Kimberley Flora (A.A. Mitchell 2745) | - | <1% |
| *Trichodesma zeylanicum* var. *grandiflorum* | 1% | <1% |
| *Triodia epactia* | <1% | <1% |
| *Triodia schinzii* | 35-40% | 35-40% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT033

**Date established:** 30/08/2013 **Date rescored:** 26/06/2014

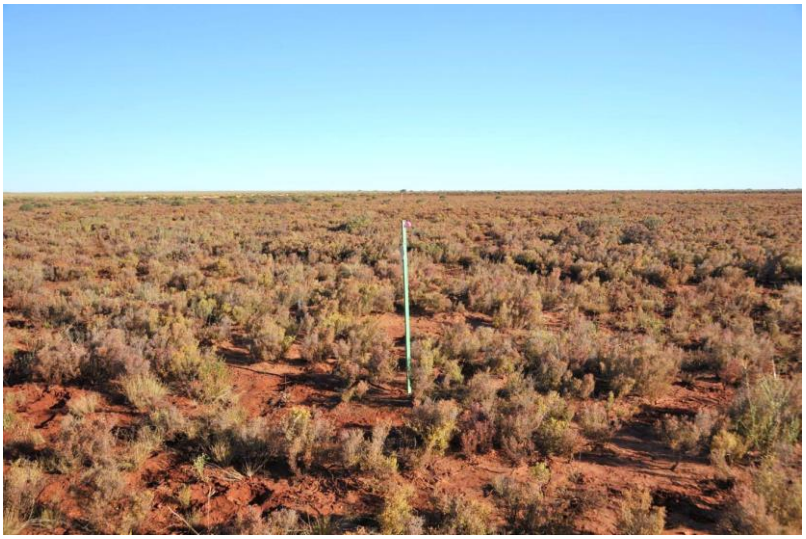
**Lat/Long (dd):** -22.60598648°S 119.7833621°E

**MGA Zone 50** 786144.2118mE 7497423.271 mN

**Location:** On SE margin of Fortescue Marsh, 9.9 km S of Moorimordinia Pool, 10.1 km SW of 14 Mile Pool, 17.6 km W of Roy Hill summit, 31.6 km SSE of Karntama Village (Christmas Creek Mine), 18.2 km WNW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Mid-dense shrubland of *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552), *Tecticornia indica* subsp. *bidens* and occasional *Eremophila spongiocarpa* over sparse cover of *Cullen cinereum*, *Eragrostis dielsii* Streptoglossa spp, *Sporobolus australasicus* and *Swainsona kingii*.

**Site:** Margin of extensive saline flood plain and lake bed with deep (>0.5m), red-brown, sandy soils.



| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Aristida contorta* | - | <1% |
| *Cullen cinereum* | <1% | 1-2% |
| *Dactyloctenium radulans* | - | <1% |
| *Enneapogon caerulescens* | - | <1% |
| *Eragrostis dielsii* | 2-5% | 2-5% |
| *Eremophila spongiocarpa* | <1% | <1% |
| *Eulalia aurea* | <1% | <1% |
| *Lawrencia densiflora* | - | <1% |
| *Lotus cruentus* | <1% | <1% |
| *Maireana amoena* | <1% | <1% |
| *Maireana luehmannii* | <1% | <1% |
| *Muellerolimon salicorniaceum* | <1% | <1% |
| *Nicotiana heterantha* | <1% | <1% |
| *Portulaca filifolia* | <1% | <1% |
| *Senna* sp. Meekatharra (E. Bailey 1-26) | <1% | <1% |
| *Sida fibulifera* | <1% | <1% |
| *Sporobolus australasicus* | 1-2% | 8-10% |
| *Streptoglossa adscendens* | <1% | <1% |
| *Streptoglossa bubakii* | 1% | <1% |
| *Streptoglossa decurrens* | <1% | <1% |
| *Streptoglossa liatroides* | <1% | <1% |
| *Streptoglossa odora* | <1% | <1% |
| *Streptoglossa tenuiflora* | <1% | <1% |
| *Swainsona kingii* | <1% | - |
| *Tecticornia indica* subsp. *bidens* | <1% | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | 50-60% | 50-60% |
| *Trianthema triquetrum* | - | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT034

**Date established:** 31/08/2013 **Date rescored:** 27/06/2014

**Lat/Long (dd):**-22.55212747°S 119.8661888°E

**MGA Zone 50** 794778.8991 mE 7503228.836 mN

**Location:** On NE margin of Fortescue Marsh, 300m from 14 Mile Pool, 10.3 km ESE of Moorimordinia Pool, 30.8 km SE of Karntama Village (Christmas Creek Mine), 10.6 km WNW of Roy Hill summit, 15.3 km NNW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Very sparse shrubland of *Melaleuca glomerata* and occasional Eucalyptus victrix and *Acacia ampliceps*, over mid-dense shrubland of *Muellerolimon salicorniaceum*, *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)*Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) and *Duma florulenta* over very sparse cover of

**Site:** Flood zone adjacent to permanent freshwater pool in channel on margin of extensive saline flood plain with surface fragments of BIF on deep (>0.5m), red brown , silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Acacia ampliceps* | <1% | <1% |
| *Alternanthera denticulata* | - | <1% |
| *Alternanthera nodiflora* | - | <1% |
| *Atriplex amnicola* | <1% | <1% |
| *Centipeda minima* subsp. *macrocephala* | - | <1% |
| *Cullen cinereum* | <1% | <1% |
| *Cyperus bulbosus* | - | <1% |
| *Duma florulenta* | 2-3% | 2-3% |
| *Echinochloa colona* | - | <1% |
| *Eragrostis dielsii* | 5% | 5% |
| *Eragrostis* tenellula | - | <1% |
| *Eremophila spongiocarpa* | <1% | <1% |
| *Frankenia ambita* | <1% | <1% |
| *Heliotropium curassavicum* | - | <1% |
| *Malvastrum americanum* | <1% | - |
| *Marsilea hirsuta* | <1% | <1% |
| *Melaleuca glomerata* | 10-15% | 10-15% |
| *Muellerolimon salicorniaceum* | 50-60% | 50-60% |
| *Nicotiana heterantha* | <1% | 1% |
| *Parkinsonia aculeata* | <1% | <1% |
| *Portulaca oleracea* | <1% | - |
| *Ptilotus nobilis* subsp. *nobilis* | <1% | - |
| *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) | 2-5% | 2-5% |
| *Solanum lasiophyllum* | <1% | - |
| *Sporobolus australasicus* | - | <1% |
| *Sporobolus mitchellii* | <1% | <1% |
| *Swainsona tanamiensis* | <1% | 1-2% |
| *Tecticornia auriculata* | <1% | <1% |
| *Tecticornia indica* subsp. *bidens* | <1% | <1% |
| *Tecticornia indica* subsp. *leiostachya* | <1% | <1% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | 10-15% | 10-15% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | <1% | <1% |
| *Trianthema* aff. *triquetrum* | <1% | - |
| *Trigonella suavissima* | <1% | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT035

**Date established:** 31/08/2013 **Date rescored:** 27/06/2014

**Lat/Long (dd):** -22.55353614°S 119.8635159°E

**MGA Zone 50** 794500.8414 mE 7503078.046 mN

**Location:** On banks of 14 Mile Pool, Fortescue Marsh, 10.5 km ESE of Moorimordinia Pool, 30.8 km SE of Karntama Village (Christmas Creek Mine), 10.8 km WNW of Roy Hill summit, 15.3 km NW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Dense woodland and shrubland of *Eucalyptus camaldulensis* subsp. *obtusa* and *Acacia ampliceps* over very sparse shrubs of *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702), over very sparse herbs of *Trigonella suavissima*, *Centipeda minima* subsp. *macrocephala*, *Centipeda crateriformis* subsp. *crateriformis*, Polygonum

**Site:** Embankment of permanent freshwater channel on margin of extensive saline flood plain with surface fragments of BIF and other metasediments on deep (>0.5m), red-brown, loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Acacia ampliceps* | 35% | 35% |
| *Alternanthera denticulata* | <1% | <1% |
| *Alternanthera nodiflora* | <1% | <1% |
| *Atriplex flabelliformis* | - | <1% |
| *Centipeda crateriformis* subsp. *crateriformis* | 2-5% | 3-6% |
| *Centipeda minima* subsp. *macrocephala* | 2-3% | 2-3% |
| *Cressa australis* | - | <1% |
| *Cullen cinereum* | - | <1% |
| *Cynodon dactylon* | <1% | <1% |
| *Cyperus rigidellus* | - | <1% |
| *Eragrostis leptocarpa* | - | <1% |
| *Eriochloa pseudoacrotricha* | - | <1% |
| *Eucalyptus camaldulensis* subsp. *obtusa* | 45% | 45% |
| *Frankenia ambita* | - | <1% |
| *Helichrysum luteoalbum* | - | <1% |
| *Heliotropium curassavicum* | <1% | <1% |
| *Melaleuca glomerata* | <1% | <1% |
| *Muellerolimon salicorniaceum* | <1% | <1% |
| *Nicotiana heterantha* | - | <1% |
| *Polygonum plebeium* | <1% | 2-5% |
| *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) | 8-10% | 8-10% |
| *Schenkia clementii* | <1% | - |
| *Sesbania cannabina* | <1% | <1% |
| *Sporobolus australasicus* | - | <1% |
| *Tecticornia pergranulata* subsp. *pergranulata* | - | <1% |
| *Trigonella suavissima* | <1% | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT036

**Date established:** 1/09/2013 **Date rescored:** 28/06/2014

**Lat/Long (dd):**-22.54907202 °S 119.8610419°E

**MGA Zone 50** 794255.7381 mE 7503577.515 mN

**Location:** On NE margin of Fortescue Marsh of Fortescue Marsh, 600 m NNW of 14 Mile Pool, 9.7 km ESE of Moorimordinia Pool, 30.2 km SE of Karntama Village (Christmas Creek Mine), 11.3 km WNW of Roy Hill summit, 15.9 km NW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Mid-dense *Tecticornia auriculata*, *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) *Eremophila spongiocarpa* and *Tecticornia indica* subsp. *bidens* over very sparse cover of *Eragrostis dielsii* and *Maireana luehmannii*.

**Site:** Stony flats on margin of extensive flood plain and freshwater channel with surface fragments of calcrete, BIF and other metasediments on shallow, red-brown (pale crust), loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Abutilon* oxycarpum subsp. Prostrate (A.A. Mitchell PRP 1266) . | - | <1% |
| *Acacia synchronicia* | <1% | <1% |
| *Acacia tetragonophylla* | - | <1% |
| *Aerva javanica* | <1% | <1% |
| *Alternanthera angustifolia* | - | <1% |
| *Angianthus cyathifer* | <1% | - |
| *Atriplex amnicola* | <1% | <1% |
| *Atriplex bunburyana* | <1% | <1% |
| *Boerhavia* cf. *coccinea* | - | <1% |
| *Cenchrus ciliaris* | <1% | <1% |
| *Chloris pectinata* | <1% | <1% |
| *Convolvulus clementii* | - | <1% |
| *Cucumis melo* | - | <1% |
| *Cullen cinereum* | <1% | <1% |
| *Cyperus bulbosus* | - | <1% |
| *Dactyloctenium radulans* | <1% | <1% |
| *Dichanthium sericeum* subsp. *humilius* | - | <1% |
| *Duma florulenta* | <1% | <1% |
| *Dysphania plantaginella* | - | <1% |
| *Dysphania congestiflora* | - | <1% |
| *Einadia nutans* subsp. *eremaea* | <1% | <1% |
| *Enchylaena tomentosa* var. *tomentosa* | <1% | <1% |
| *Enneapogon caerulescens* | <1% | <1% |
| *Enneapogon polyphyllus* | <1% | <1% |
| *Enteropogon ramosus* | <1% | <1% |
| *Eragrostis dielsii* | S | 5-10% |
| *Eragrostis xerophila* | <1% | - |
| *Eremophea spinosa* | <1% | <1% |
| *Eremophila spongiocarpa* | 2-5% | 2% |
| *Euphorbia vaccaria* var. *erucoides* | - | <1% |
| *Evolvulus alsinoides* var. *villosicalyx* | <1% | - |
| *Frankenia ambita* | <1% | <1% |
| *Gomphrena affinis* subsp. *pilbarensis* | <1% | <1% |
| *Ipomoea coptica* | - | <1% |
| *Lepidium phlebopetalum* | - | <1% |
| *Lotus cruentus* | - | <1% |
| *Maireana carnosa* | <1% | - |
| *Maireana luehmannii* | <1% | <1% |
| *Malvastrum americanum* | <1% | <1% |
| *Melaleuca glomerata* | <1% | <1% |
| *Muellerolimon salicorniaceum* | <1% | <1% |
| *Nicotiana heterantha* | <1% | <1% |
| *Paspalidium aff. jubiflorum* | <1% | <1% |
| *Pluchea rubelliflora* | - | <1% |
| *Portulaca oleracea* | <1% | <1% |
| *Ptilotus gomphrenoides* | <1% | <1% |
| *Sclerolaena* aff. *densiflora* | <1% | <1% |
| *Sclerolaena cuneata* | <1% | <1% |
| *Sclerolaena densiflora* | <1% | <1% |
| Setaria verticillata | <1% | <1% |
| *Sida fibulifera* | <1% | - |

| | | |
|---|---|---|
| *Sporobolus australasicus* | <1% | <1% |
| *Sporobolus mitchellii* | <1% | <1% |
| *Swainsona kingii* | <1% | <1% |
| *Tecticornia auriculata* | 10-15% | 10-15% |
| *Tecticornia indica* subsp. *bidens* | 15-20% | 10-15% |
| *Tecticornia indica* subsp. *leiostachya* | 5-8% | 5-8% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | 5-8% | 5-8% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | <1% | <1% |
| *Trianthema triquetrum* | - | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT037

**Date established:** 1/09/2013 **Date rescored:** 28/06/2014

**Lat/Long (dd):** -22.55140554°S 119.86046°E

**MGA Zone 50** 794190.8957 mE 7503320.129 mN

**Location:** On NE margin of Fortescue Marsh, 400m NW of 14 Mile Pool, 9.8 km ESE of Moorimordinia Pool, 30.4 km SE of Karntama Village (Christmas Creek Mine), 11.2 km WNW of Roy Hill summit, 15.7 km NW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Sparse tree mallee of Eucalyptus victrix over mid-dense shrubland of *Duma florulenta*, *Acacia synchronicia* and *Eremophila spongiocarpa*, over very sparse shrubs of *Solanum morrisonii*, *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)& T. Colmer et al. KS 1063) and *Tecticornia indica*

**Site:** Alluvial flats on margin of extensive flood plain and freshwater channel with surface fragments of BIF and other metasediments on deep (>0.5m), red-brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Abutilon lepidum* | <1% | <1% |
| *Acacia ampliceps* | <1% | <1% |
| *Acacia synchronicia* | 15-20% | 15-20% |
| *Alternanthera denticulata* | <1% | <1% |
| *Alternanthera nodiflora* | <1% | <1% |
| *Atriplex amnicola* | <1% | <1% |
| *Atriplex* cf. *bunburyana* | <1% | <1% |
| *Bergia perennis* subsp. *obtusifolia* | 10-15% | 10-15% |
| *Boerhavia* cf. *coccinea* | - | <1% |
| *Calocephalus beardii* | <1% | - |
| *Calocephalus knappii* | <1% | - |
| *Centipeda minima* subsp. *macrocephala* | <1% | - |
| *Chloris pectinata* | <1% | <1% |
| *Cleome viscosa* | <1% | <1% |
| *Convolvulus clementii* | <1% | - |
| *Corchorus* cf. *laniflorus* | <1% | - |
| *Cullen cinereum* | <1% | <1% |
| *Dactyloctenium radulans* | <1% | <1% |
| *Dichanthium sericeum* subsp. *humilius* | - | <1% |
| *Duma florulenta* | 20-25% | 20-25% |
| *Einadia nutans* subsp. *eremaea* | - | <1% |
| *Enchylaena tomentosa* var. *tomentosa* | <1% | <1% |
| *Eragrostis dielsii* | 5% | 5% |
| *Eragrostis leptocarpa* | <1% | <1% |
| *Eragrostis* setifolia | <1% | <1% |
| *Eragrostis xerophila* | <1% | <1% |
| *Eremophila spongiocarpa* | 8-10% | 8-10% |
| Eucalyptus victrix | 10-15% | 10-15% |
| *Evolvulus alsinoides* var. *villosicalyx* | - | <1% |
| *Frankenia ambita* | <1% | <1% |
| *Gomphrena affinis* subsp. *pilbarensis* | <1% | - |
| *Lotus cruentus* | - | <1% |
| *Malvastrum americanum* | <1% | <1% |
| *Marsilea hirsuta* | <1% | <1% |
| *Melaleuca glomerata* | <1% | <1% |
| *Minuria integerrima* | <1% | <1% |
| *Muellerolimon salicorniaceum* | <1% | <1% |
| *Neptunia dimorphantha* | - | <1% |
| *Nicotiana heterantha* | <1% | <1% |
| Panicum laevinode | - | <1% |
| *Parkinsonia aculeata* | <1% | <1% |
| *Paspalidium aff. jubiflorum* | <1% | <1% |
| *Pluchea dunlopii* | <1% | - |
| *Pluchea rubelliflora* | <1% | <1% |
| *Portulaca oleracea* | <1% | <1% |
| *Pterocaulon sphacelatum* | <1% | <1% |
| *Ptilotus gomphrenoides* | <1% | <1% |
| *Rhynchosia australis* | - | <1% |
| *Rostellularia adscendens* var. *clementii* | - | <1% |
| *Salsola australis* | <1% | - |
| *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) | <1% | <1% |
| *Scaevola spinescens* | <1% | <1% |

| | | |
|---|---|---|
| *Sclerolaena densiflora* | <1% | - |
| *Sida fibulifera* | <1% | <1% |
| *Solanum lasiophyllum* | <1% | <1% |
| *Solanum morrisonii* | <1% | <1% |
| *Sporobolus australasicus* | 2-5% | <1% |
| *Sporobolus mitchellii* | 10-15% | 10-15% |
| *Streptoglossa adscendens* | <1% | - |
| *Swainsona kingii* | <1% | <1% |
| *Tecticornia indica* subsp. *bidens* | 5% | 5% |
| *Tecticornia indica* subsp. *leiostachya* | <1% | <1% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | <1% | <1% |
| *Trianthema triquetrum* | <1% | <1% |
| *Vachellia farnesiana* | <1% | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT038

**Date established:** 2/09/2013 **Date rescored:** 29/06/2014

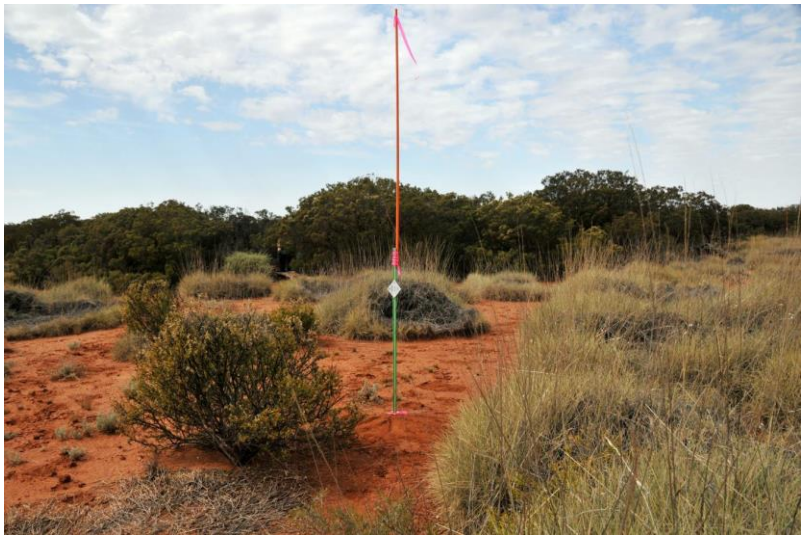
**Lat/Long (dd):**-22.63173217°S 119.8317563°E

**MGA Zone 50** 791067.9733 mE 7494477.057 mN

**Location:** On SE margin of Fortescue Marsh, 14.1 km SSE of Moorimordinia Pool, 9.3 km SSW of 14 Mile Pool, 36.3 km SSE of Karntama Village (Christmas Creek Mine), 13 km WSW of Roy Hill summit, 12.6 km WNW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Mosaic of sparse shrubland of *Eremophila spongiocarpa*, *Atriplex amnicola* and *Rhagodia eremaea* over sparse subshrubs of *Maireana luehmannii*, *Eremophea spinosa*, *Lawrencia* glomerata and *Lawrencia densiflora*; and mid-dense *Melaleuca xerophila* thicket over shrubs of *Scaevola spinescens*, *Maireana pyramidata*, *Enchylaena tomentosa* and *Rhagodia eremaea* over mid-dense cover of *Lawrencia densiflora* and *Sporobolus caroli*.

**Site:** Margin of calcrete plain and margin of extensive saline flood plain and lake bed with surface fragments of calcrete on deep (>0.5m), red-brown (pale surface), loamy sand soils.



| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Acrachne racemosa* | <1% | - |
| *Atriplex bunburyana* | <1% | <1% |
| *Chenopodium gaudichaudianum* | <1% | <1% |
| *Chloris pectinata* | <1% | - |
| *Dichanthium sericeum* subsp. *humilius* | - | <1% |
| *Enchylaena tomentosa* var. *tomentosa* | <1% | <1% |
| *Enneapogon caerulescens* | <1% | <1% |
| *Eragrostis dielsii* | 2% | 5-8% |
| *Eragrostis xerophila* | 1-2% | 1-2% |
| *Eremophea spinosa* | 8-10% | 8-10% |
| *Eremophila spongiocarpa* | 5% | 5% |
| *Lawrencia densiflora* | <1% | <1% |
| *Lawrencia* glomerata | <1% | <1% |
| *Maireana luehmannii* | <1% | <1% |
| *Maireana pyramidata* | <1% | <1% |
| *Maireana tomentosa* subsp. *tomentosa* | <1% | - |
| *Melaleuca xerophila* | 40-45% | 40-45% |
| *Muellerolimon salicorniaceum* | <1% | <1% |
| *Paspalidium* constrictum | <1% | <1% |
| *Portulaca filifolia* | <1% | <1% |
| *Portulaca intraterranea* | <1% | <1% |
| *Portulaca oleracea* | <1% | <1% |
| *Ptilotus nobilis* subsp. *nobilis* | <1% | <1% |
| *Scaevola spinescens* | <1% | <1% |
| *Sida fibulifera* | <1% | <1% |
| *Solanum lasiophyllum* | - | <1% |
| *Sporobolus australasicus* | - | <1% |
| *Sporobolus caroli* | 15-20% | 15-20% |
| *Streptoglossa bubakii* | <1% | <1% |
| *Streptoglossa liatroides* | <1% | <1% |
| *Streptoglossa tenuiflora* | <1% | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | <1% | <1% |
| *Triodia longiceps* | 2% | 2% |
| *Zygophyllum eichleri* | <1% | - |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT039

**Date established:** 4/09/2013 **Date rescored:** 21/06/2014

**Lat/Long (dd):** -22.31619467 119.1499525°E

**MGA Zone 50** 721461.8296 mE 7530595.798 mN

**Location:** On NW margin of Fortescue Marsh, 16.1 km ENE of Cowra Line Camp, 7.6 km ESE of Kardardarrie Well, 12.3 km W of Minga Bore, 29.1 km W of Cloudbreak Mine Village, 44 km NW of Marillana Homestead.

**Vegetation:** Mid-dense shrubland of *Muellerolimon salicorniaceum*, over sparse shrub and grasses of *Tecticornia indica* subsp. *bidens* and *Tecticornia auriculata*, *Frankenia ambita* and *Eragrostis dielsii*.

**Site:** Extensive saline flood plain and lake bed with surface fragments of occasional shells on deep (>0.5m), red-brown , silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cyperus bulbosus* | - | 2-5% |
| *Eleocharis papillosa* | - | 10-15% |
| *Eragrostis dielsii* | 2% | <1% |
| *Frankenia ambita* | <1% | <1% |
| *Heliotropium curassavicum* | - | <1% |
| *Mimulus* aff *gracilis* | - | 40% |
| *Muellerolimon salicorniaceum* | 35% | 35% |
| *Nicotiana heterantha* | - | 2-5% |
| *Swainsona tanamiensis* | - | <1% |
| *Tecticornia auriculata* | 2-5% | 2-5% |
| *Tecticornia globulifera* | - | <1% |
| *Tecticornia indica* subsp. *bidens* | 15-20% | <1% |
| *Tecticornia medusa* | - | <1% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | <1% | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | <1% | - |
| *Triglochin hexagona* | - | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT040

**Date established:** 4/09/2013 **Date rescored:** 21/06/2014

**Lat/Long (dd):** -22.31765429°S 119.1479797°E

**MGA Zone 50** 721256.2402 mE 7530437.047 mN

**Location:** On NW margin of Fortescue Marsh, 15.8 km ENE of Cowra Line Camp, 7.5 km ESE of Kardardarrie Well, 12.5 km W of Minga Bore, 44 km NW of Marillana Homestead, 29.3 km W of Cloudbreak Mine Village.

**Vegetation:** Sparse shrubland of *Tecticornia medusa*, over sparse shrubland of *Tecticornia pergranulata* subsp. *pergranulata* over sparse cover of *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)& T. Colmer et al. KS 1063) seedlings.

**Site:** Extensive saline flood plain and lake bed with deep (>0.5m), red-brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Mimulus* aff *gracilis* | - | 5-8% |
| *Muellerolimon salicorniaceum* | <1% | - |
| *Tecticornia* sp. sterile | | |
| *Tecticornia auriculata* | <1% | - |
| *Tecticornia indica* subsp. *bidens* | <1% | - |
| *Tecticornia medusa* | 15-20% | 15-20% |
| *Tecticornia pergranulata* subsp. *pergranulata* | 25% | 25% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | 5% | - |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT041

**Date established:** 4/09/2013 **Date rescored:** 21/06/2014

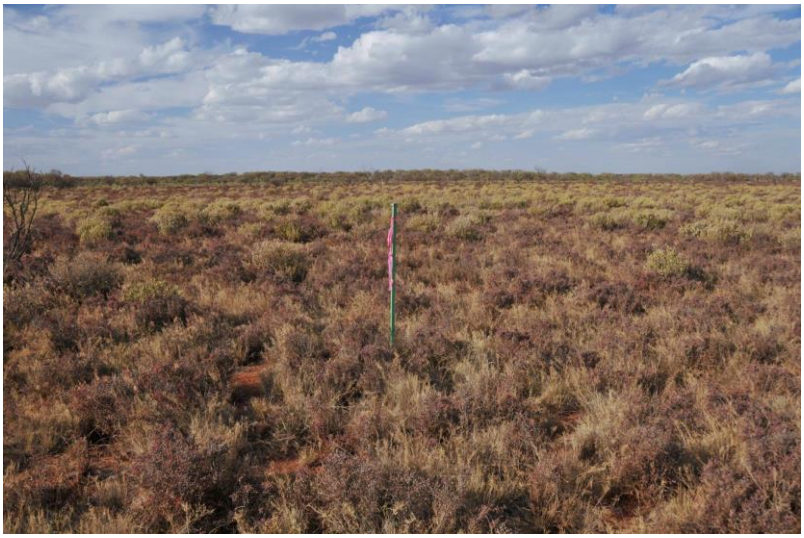
**Lat/Long (dd):** -22.31130115°S 119.1551595°E

**MGA Zone 50** 722006.1166 mE 7531130.08 mN

**Location:** On NW margin of Fortescue Marsh, 16.8 km ENE of Cowra Line Camp, 7.9 km ESE of Kardardarrie Well, 11.8 km W of Minga Bore, 44.1 km NW of Marillana Homestead, 28.5 km W of Cloudbreak Mine Village.

**Vegetation:** Mid-dense shrubland of *Eremophila spongiocarpa* and *Tecticornia indica* subsp. *bidens* over mid-dense tussock grassland of *Eragrostis dielsii*.

**Site:** Stony flats on margin of extensive flood plain and freshwater channel with surface fragments of BIF, associated metasediments and calcrete on shallow, red-brown, silty loam soils



| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Calotis plumulifera* | <1% | <1% |
| *Chloris pectinata* | - | <1% |
| *Convolvulus clementii* | - | <1% |
| *Cullen cinereum* | <1% | <1% |
| *Dactyloctenium radulans* | - | <1% |
| *Dissocarpus paradoxus* | <1% | <1% |
| *Enteropogon ramosus* | - | <1% |
| *Eragrostis dielsii* | 25-30% | 15% |
| *Eragrostis leptocarpa* | <1% | <1% |
| *Eremophila spongiocarpa* | 20% | 20% |
| *Euphorbia biconvexa* | - | <1% |
| *Flaveria trinervia* | - | <1% |
| *Hibiscus brachysiphonius* | <1% | - |
| *Ipomoea coptica* | - | <1% |
| *Nicotiana heterantha* | - | <1% |
| *Panicum decompositum* | <1% | <1% |
| *Paspalidium aff. jubiflorum* | 2-3% | 15% |
| *Pluchea dunlopii* | - | <1% |
| *Pluchea rubelliflora* | - | <1% |
| *Portulaca filifolia* | - | <1% |
| *Rhynchosia minima* | - | <1% |
| *Sida fibulifera* | <1% | <1% |
| *Solanum morrisonii* | <1% | <1% |
| *Tecticornia indica* subsp. *bidens* | 35-40% | 35-40% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | <1% | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT042

**Date established:** 5/09/2013 **Date rescored:** 15/06/2014

**Lat/Long (dd):**-22.36174017°S 119.0189219°E

**MGA Zone 50** 707892.947 mE 7525738.693 mN

**Location:** On W margin of Fortescue Marsh, 500 m NE of Cowra Line Camp, 11.2 km SW of Kardardarrie Well, 11.9 km NW of Mingah Well, 32.6 km E of Auski Roadhouse, 51.1 km NW of Marillana Homestead, 44.2 km W of Cloudbreak Mine Village.

**Vegetation:** Very sparse shrubland of *Tecticornia auriculata* over very sparse shrubland of *Tecticornia indica* subsp. *bidens*, over sparse to very sparse grassland *Eragrostis dielsii* s.l.

**Site:** Extensive saline flood plain and lake bed with deep (>0.5m), red-brown (pale surface), silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cyperus bulbosus* | - | 2% |
| *Eleocharis papillosa* | - | 20%-25% |
| *Eragrostis dielsii* | 15-20% | 30-40% |
| *Frankenia ambita* | <1% | - |
| *Maireana luehmannii* | <1% | <1% |
| *Nicotiana heterantha* | <1% | <1% |
| *Ptilotus nobilis* subsp. *nobilis* | <1% | - |
| *Salsola australis* | <1% | - |
| *Tecticornia auriculata* | 5% | 5% |
| *Tecticornia indica* subsp. *bidens* | 5-8% | 5-8% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | <1% | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | <1% | <1% |
| *Trianthema triquetrum* | <1% | - |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT043

**Date established:** 5/09/2013 **Date rescored:** 11/09/2014

**Lat/Long (dd):** -22.34223599 119.2164085°E

**MGA Zone 50** 728267.308 mE 7527612.599 mN

**Location:** On NW margin of Fortescue Marsh, 2.1 km NNE of Cowra Line Camp, 9.8 km SW of Kardardarrie Well, 26.8 km W of Minga Bore, 33.1 km E of Auski Roadhouse, 43.7 km W of Cloudbreak Mine Village.

**Vegetation:** Isolated shrubs of *Tecticornia medusa* over sparse shrubland of *Tecticornia medusa*, *Tecticornia auriculata*, *Tecticornia globulifera* and *Tecticornia indica* subsp. *bidens*.

**Site:** Ephemeral drainage channel and lake bed in extensive saline flood plain with surface fragments of metasediments, BIF, and quartz from the Chichester Ranges on deep (>0.5m), red-brown, loamy sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Mimulus* aff *gracilis* | - | 15-20% |
| *Tecticornia auriculata* | 1-2% | - |
| *Tecticornia globulifera* | 5% | 1-2% |
| *Tecticornia indica* subsp. *bidens* | <1% | <1% |
| *Tecticornia medusa* | 10-15% | 10-15% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | <1% | - |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | <1% | - |
| *Tecticornia* verrucosa | - | 8-10% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT044

**Date established:** 5/09/2013 **Date rescored:** 22/06/2014

**Lat/Long (dd):** -22.36141345°S 119.0068249°E

**MGA Zone 50** 706647.4063 mE 7525791.534 mN

**Location:** On far W side of Fortescue Marsh, 1.7 km E of Cowra Line Camp, 10.4 km SW of Kardardarrie Well, 11.1 km NW of Mingah Well, 33.8 km E of Auski Roadhouse, 43 km W of Cloudbreak Mine Village.

**Vegetation:** Sparse shrubland of *Acacia tetragonophylla* and *Acacia sclerosperma* subsp. *sclerosperma* over mid-dense hummock grassland of *Triodia longiceps* and occasional shrubs of *Ptilotus obovatus*, *Corchorus sidoides* subsp. *sidoides*, *Corchorus lasiocarpus* subsp. *lasiocarpus* and *Stemodia grossa*.

**Site:** Stony calcrete plain near edge of extensive saline flood plain with surface fragments of calcrete on shallow, orange-brown , sandy loam (boundary) soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Abutilon* otocarpum | - | <1% |
| *Acacia bivenosa* x *sclerosperma* subsp. | <1% | <1% |
| *Acacia* pruinocarpa | <1% | <1% |
| *Acacia sclerosperma* subsp. *sclerosperma* | 10-12% | 10-12% |
| *Acacia synchronicia* | <1% | <1% |
| *Acacia tetragonophylla* | <1% | <1% |
| *Anthobolus leptomerioides* | <1% | <1% |
| *Aristida contorta* | - | <1% |
| *Aristida inaequiglumis* | <1% | - |
| *Bulbostylis barbata* | - | <1% |
| *Cenchrus ciliaris* | <1% | <1% |
| *Corchorus lasiocarpus* subsp. *lasiocarpus* | <1% | <1% |
| *Corchorus sidoides* subsp. *sidoides* | <1% | <1% |
| *Cucumis variabilis* | <1% | - |
| *Digitaria brownii* | <1% | <1% |
| *Duperreya commixta* | <1% | <1% |
| *Dysphania rhadinostachya* subsp. *rhadinostachya* | <1% | - |
| *Enchylaena tomentosa* var. *tomentosa* | <1% | <1% |
| *Enneapogon polyphyllus* | <1% | <1% |
| *Eragrostis dielsii* | <1% | - |
| *Eragrostis eriopoda* | - | <1% |
| *Eremophila longifolia* | <1% | <1% |
| *Eulalia aurea* | <1% | <1% |
| *Evolvulus alsinoides* var. *villosicalyx* | <1% | - |
| *Goodenia microptera* | <1% | <1% |
| *Hakea lorea* subsp. *lorea* | <1% | <1% |
| *Hibiscus brachychlaenus* | <1% | <1% |
| *Hibiscus leptocladus* | <1% | <1% |
| *Hibiscus sturtii* var. *campylochlamys* | <1% | <1% |
| *Hibiscus sturtii* var. platychlamys | <1% | <1% |
| *Indigofera monophylla* | <1% | <1% |
| *Paraneurachne muelleri* | 5% | 5% |
| *Peripleura arida* | <1% | <1% |
| *Pluchea ferdinandi-muelleri* | <1% | <1% |
| *Pluchea tetranthera* | <1% | <1% |
| *Pterocaluon sphacelatum* | <1% | - |
| *Ptilotus astrolasius* | <1% | <1% |
| *Ptilotus nobilis* subsp. *nobilis* | <1% | <1% |
| *Ptilotus obovatus* | <1% | <1% |
| *Rhagodia eremaea* | <1% | <1% |
| *Rhynchosia minima* | - | <1% |
| *Salsola australis* | <1% | <1% |
| *Scaevola spinescens* | <1% | <1% |
| *Senna artemesioides* subsp. *helmsii* x *oligophylla* | <1% | <1% |
| *Senna notabilis* | <1% | <1% |
| *Sida arsiniata* | <1% | <1% |
| *Sida echinocarpa* | <1% | <1% |
| *Sida* sp. verrucose glands (F.H. Mollemans | <1% | <1% |
| *Solanum lasiophyllum* | <1% | <1% |
| *Stemodia grossa* | <1% | <1% |
| *Streptoglossa decurrens* | <1% | <1% |
| *Trichodesma zeylanicum* var. *zeylanicum* | <1% | <1% |
| *Triodia longiceps* | 65-70% | 65-70% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT045

**Date established:** 6/09/2013 **Date rescored:** 22/06/2014

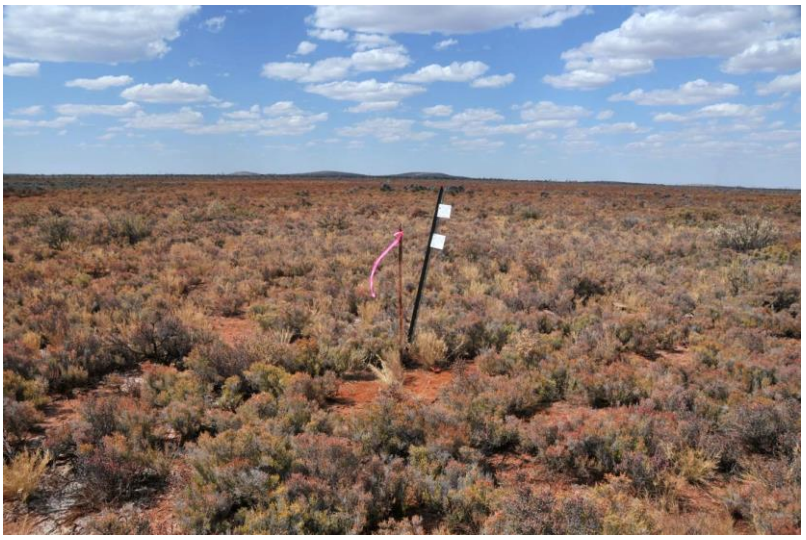
**Lat/Long (dd):** -22.34695282°S 119.0103752°E

**MGA Zone 50** 707034.4783 mE 7527388.019 mN

**Location:** On far W side of Fortescue Marsh, 37.8 km NNW of Marillana Homestead, 22.1 km E of Cowra Line Camp and 15.1 km ESE of Kardardarrie Well, 17.6 km NE of Mingah Well, 22.6 km W of Cloudbreak Mine Village.

**Vegetation:** Very sparse shrubland of *Eremophila spongiocarpa* and *Tecticornia auriculata* over mid-dense shrubland of *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552), *Tecticornia indica* subsp. *bidens* over sparse grassland of *Eragrostis dielsii*.

**Site:** Stony flats on margin of extensive saline flood plain with surface fragments of calcrete, metasediments from adj hills on deep (>0.5m), red-brown soil lichen crust, loamy sand soils



| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cenchrus ciliaris* | <1% | - |
| *Chloris pectinata* | - | <1% |
| *Cyperus bulbosus* | - | <1% |
| *Dactyloctenium radulans* | - | <1% |
| *Digitaria coenicola* | - | <1% |
| *Dysphania congestiflora* | - | 1-2% |
| *Enneapogon caerulescens* | - | <1% |
| *Enneapogon polyphyllus* | - | <1% |
| *Eragrostis dielsii* | 5-8% | 5-8% |
| *Eremophila spongiocarpa* | <1% | <1% |
| *Flaveria trinervia* | <1% | <1% |
| *Frankenia ambita* | <1% | - |
| *Lawrencia densiflora* | <1% | <1% |
| *Maireana luehmannii* | <1% | <1% |
| *Nicotiana heterantha* | <1% | <1% |
| *Ptilotus nobilis* subsp. *nobilis* | <1% | <1% |
| *Salsola australis* | <1% | - |
| *Swainsona kingii* | <1% | - |
| *Tecticornia auriculata* | 1% | 1% |
| *Tecticornia indica* subsp. *bidens* | 10-15% | 10-15% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | <1% | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | 35-40% | 35-40% |
| *Triraphis mollis* | - | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT046

**Date established:** 6/09/2013 **Date rescored:** 11/09/2014

**Lat/Long (dd):** -22.34277352°S 119.2141194°E

**MGA Zone 50** 728030.5952 mE 7527556.536 mN

**Location:** On NW margin of Fortescue Marsh, 6.1 km WSW of Minga Bore, 14.9 km ESE of Kardardarrie Well, 37.9 km NNW of Marillana Homestead, 54 km E of Auski Roadhouse, 21.9 km E of Cowra Line Camp, 22.8 km W of Cloudbreak Mine Village.

**Vegetation:** Isolated shrubs of *Muellerolimon salicorniaceum* over sparse shrubland of *Tecticornia globulifera* and occasional *Tecticornia medusa*.

**Site:** Edge of ephemeral lake bed on extensive saline flood plain with surface fragments of BIF, metasediments (a lot of grey rock), quartz, roxiella shells on deep (>0.5m), red-brown (pale surface), sandy loam soils

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Atriplex flabelliformis* | <1% | - |
| *Frankenia ambita* | <1% | <1% |
| *Maireana luehmannii* | <1% | - |
| *Mimulus* aff *gracilis* | - | 8% |
| *Muellerolimon salicorniaceum* | <1% | <1% |
| *Tecticornia globulifera* | 20-25% | 20-25% |
| *Tecticornia medusa* | <1% | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | <1% | - |
| *Tecticornia* verrucosa | - | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT047

**Date established:** 6/09/2013 **Date rescored:** 21/06/2014

**Lat/Long (dd):** -22.34159108°S 119.20982°E

**MGA Zone 50** 727589.5738 mE 7527693.994 mN

**Location:** On NW margin of Fortescue Marsh, 6.4 km WSW of Minga Bore, 21.5 km E of Cowra Line Camp, 14.4 km ESE of Kardardarrie Well, 38.2 km NNW of Marillana Homestead, 23.2 km W of Cloudbreak Mine Village.

**Vegetation:** Mid-dense shrubland of *Muellerolimon salicorniaceum* over sparse shrubs and grasses of *Frankenia ambita* and *Eragrostis dielsii*.

**Site:** Edge of ephemeral lake bed on extensive saline flood plain with surface fragments of shells, metasediments, BIF and quartz on shallow, red-brown (pale at surface), loamy sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cyperus bulbosus* | - | <1% |
| *Eleocharis papillosa* | - | <1% |
| *Eragrostis dielsii* | 1% | 15-20% |
| *Frankenia ambita* | 15% | <1% |
| *Maireana luehmannii* | <1% | - |
| *Mimulus* aff *gracilis* | 0% | 40-50% |
| *Muellerolimon salicorniaceum* | 20-25% | 20-25% |
| *Nicotiana heterantha* | <1% | <1% |
| *Tecticornia* sp. sterile | <1% | - |
| *Tecticornia globulifera* | <1% | <1% |
| *Tecticornia indica* subsp. *bidens* | <1% | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT048

**Date established:** 6/09/2013 **Date rescored:** 11/09/2014

**Lat/Long (dd):**-22.37955364°S 119.2689432°E

**MGA Zone 50** 733617.5496 mE 7523398.981 mN

**Location:** On NW area of Fortescue Marsh, 6.4 km WSW of Minga Bore, 38.5 km NNW of Marillana Homestead, 21.4 km E of Cowra Line Camp, 14.2 km ESE of Kardardarrie Well, 23.3 km W of Cloudbreak Mine Village.

**Vegetation:** Mid-dense shrubland primarily of *Tecticornia auriculata*, with *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)& T. Colmer et al. KS 1063) and *Tecticornia indica* subsp. *bidens*, over very sparse *Eragrostis dielsii* and *Maireana luehmannii*.

**Site:** Extensive saline flood plain and lake bed with surface fragments of NA on deep (>0.5m), red-brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cyperus bulbosus* | - | 40% |
| *Eragrostis dielsii* | 2-5% | 2-5% |
| *Eremophila spongiocarpa* | <1% | <1% |
| *Maireana luehmannii* | <1% | <1% |
| *Muellerolimon salicorniaceum* | <1% | <1% |
| *Nicotiana heterantha* | <1% | <1% |
| *Swainsona kingii* | - | 1-2% |
| *Tecticornia auriculata* | 30-35% | 30-35% |
| *Tecticornia globulifera* | <1% | <1% |
| *Tecticornia indica* subsp. *bidens* | 5-8% | 5-8% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | 2-5% | 2-5% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | <1% | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT049

**Date established:** 7/09/2013 **Date rescored:** 21/06/2014

**Lat/Long (dd):** -22.33881994°S 19.2087818°E

**MGA Zone 50** 7727487.1047 mE 528002.465 mN

**Location:** On NW margin of Fortescue Marsh, 31.5 km NNW of Marillana Homestead, 21.7 km ESE of Kardardarrie Well, 6.3 km S of Minga Bore, 18.7 km WSW of Cloudbreak Mine Village.

**Vegetation:** Mid-dense shrubland of *Tecticornia indica* subsp. *Bidens*, *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)& T. Colmer et al. KS 1063) and *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) over very sparse grasses of *Eragrostis dielsii*.

**Site:** Extensive saline flood plain and lake bed with surface fragments of metasediments, quartz and soil crust on deep (>0.5m), red-brown, loamy sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cyperus bulbosus* | - | <1% |
| *Eragrostis dielsii* | 5% | 50-60% |
| *Eremophila spongiocarpa* | <1% | <1% |
| *Flaveria trinervia* | - | <1% |
| *Frankenia ambita* | <1% | - |
| *Maireana luehmannii* | <1% | <1% |
| *Muellerolimon salicorniaceum* | <1% | <1% |
| *Nicotiana heterantha* | <1% | 1% |
| *Sclerolaena* cf. *densiflora* | <1% | - |
| *Swainsona tanamiensis* | <1% | <1% |
| *Tecticornia* sp. sterile | | |
| *Tecticornia auriculata* | <1% | <1% |
| *Tecticornia indica* subsp. *bidens* | 20-30% | 20-30% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | 10-15% | 10-15% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | 2-5% | 2-5% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT050

**Date established:** 7/09/2013 **Date rescored:** 11/09/2014

**Lat/Long (dd):** -22.36727801°S 119.2661737°E

**MGA Zone 50** 733352.7702 mE 7524762.844 mN

**Location:** On NW part of Fortescue Marsh, 32.9 km NNW of Marillana Homestead, 27.1 km E of Cowra Line Camp, 20.9 km ESE of Kardardarrie Well, 5 km S of Minga Bore, 18.4 km WSW of Cloudbreak Mine Village.

**Vegetation:** Sparse shrubland of *Muellerolimon salicorniaceum* and *Tecticornia auriculata* over sparse shrubs of *Frankenia ambita*.

**Site:** Extensive saline flood plain and lake bed with occasional surface fragments of shells on deep (>0.5m), red-brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cyperus bulbosus* | - | 10-15% |
| *Eragrostis dielsii* | <1% | 2-5% |
| *Frankenia ambita* | 12-15% | 15% |
| *Heliotropium curassavicum* | - | <1% |
| *Mimulus* aff *gracilis* | - | 10-12% |
| *Muellerolimon salicorniaceum* | 8-10% | 8-10% |
| *Sclerolaena densiflora* | <1% | - |
| *Swainsona tanamiensis* | <1% | <1% |
| *Tecticornia auriculata* | 5%-8% | 5%-8% |
| *Tecticornia globulifera* | <1% | <1% |
| *Tecticornia indica* subsp. *bidens* | <1% | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT051

**Date established:** 12/09/2013 **Date rescored:** 26/08/2014

**Lat/Long (dd):** -22.3775435°S 119.3385262°E

**MGA Zone 50** 740788.2948 mE7523511.836 mN

**Location:** On N side of Fortescue Marsh, 9.4 km SE of Minga Bore, 12.5 km SW of Cloudbreak Mine Village, 29.2 km NNW of Marillana Homestead, 34.6 km E of Cowra Line Camp, 28.2 km ESE of Kardardarrie Well.

**Vegetation:** Sparse shrubland of *Tecticornia medusa* and occasional *Tecticornia auriculata* and *Tecticornia globulifera*.

**Site:** Edge of ephemeral lake bed on extensive saline flood plain with surface fragments of BIF, metasediments on deep (>0.5m), red brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Tecticornia auriculata* | <1% | - |
| *Tecticornia globulifera* | <1% | <1% |
| *Tecticornia medusa* | 15-20% | 15-20% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT052

**Date established:** 12/09/2013 **Date rescored:** 26/08/2014

**Lat/Long (dd):** -22.38577813°S 119.3381225°E

**MGA Zone 50** 740732.5342 mE 7522600.439 mN

**Location:** On central-northern area of Fortescue Marsh, 10 km SE of Minga Bore, 13.2 km SW of Cloudbreak Mine Village, 28.3 km NNW of Marillana Homestead, 28.5 km ESE of Kardardarrie Well.

**Vegetation:** Mid-dense shrubland of *Tecticornia auriculata* and *Muellerolimon salicorniaceum* over isolated plants of *Frankenia ambita* and *Eragrostis dielsii*.

**Site:** Extensive saline flood plain and lake bed with occasional surface fragments of shells and metasedimentary rocks on deep (>0.5m), red-brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Dysphania plantaginella* | - | <1% |
| *Eragrostis dielsii* | <1% | 85% |
| *Frankenia ambita* | <1% | <1% |
| *Mimulus* aff *gracilis* | <1% | - |
| *Muellerolimon salicorniaceum* | 2-5% | 2-5% |
| *Nicotiana heterantha* | - | <1% |
| *Swainsona tanamiensis* | - | <1% |
| *Tecticornia auriculata* | 35-40% | 35-40% |
| *Tecticornia globulifera* | <1% | <1% |
| *Tecticornia indica* subsp. *bidens* | <1% | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | <1% | - |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT053

**Date established:** 12/09/2013 **Date rescored:** not rescored

**Lat/Long (dd):** -22.37196777°S 119.3381725°E

MGA Zone 50 740761.4672 mE 7524129.953 mN

**Location:** On central-Northern margin of Fortescue Marsh, 9 km SE of Minga Bore, 12.2 km SW of Cloudbreak Mine Village, 29.8 km NNW of Marillana Homestead, 28 km ESE of Kardardarrie Well.

**Vegetation:** Mid-dense shrubland of *Tecticornia indica* subsp. *bidens*, *Tecticornia globulifera*, *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)& T. Colmer et al. KS 1063) and *Muellerolimon salicorniaceum* over sparse shrubs and grassland of *Frankenia ambita* and *Eragrostis dielsii* and *Tecticornia indica* subsp. *bidens* seedlings.

**Site:** Margin of extensive saline flood plain and lake bed with surface fragments of BIF, metasedimentary rocks and quartz on deep (>0.5m), orange red-brown , loamy sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cyperus bulbosus* | - | <1% |
| *Eragrostis dielsii* | 5-10% | 10-15% |
| *Frankenia ambita* | <1% | <1% |
| *Heliotropium curassavicum* | <1% | - |
| *Mimulus* aff *gracilis* | - | 1% |
| *Muellerolimon salicorniaceum* | 5% | 5% |
| *Nicotiana heterantha* | <1% | <1% |
| *Tecticornia auriculata* | <1% | <1% |
| *Tecticornia globulifera* | <1% | <1% |
| *Tecticornia indica* subsp. *bidens* | 30-35% | 30-35% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | 5-8% | 5-8% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | <1% | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT054

**Date established:** 12/09/2013 **Date rescored:** 11/09/2014

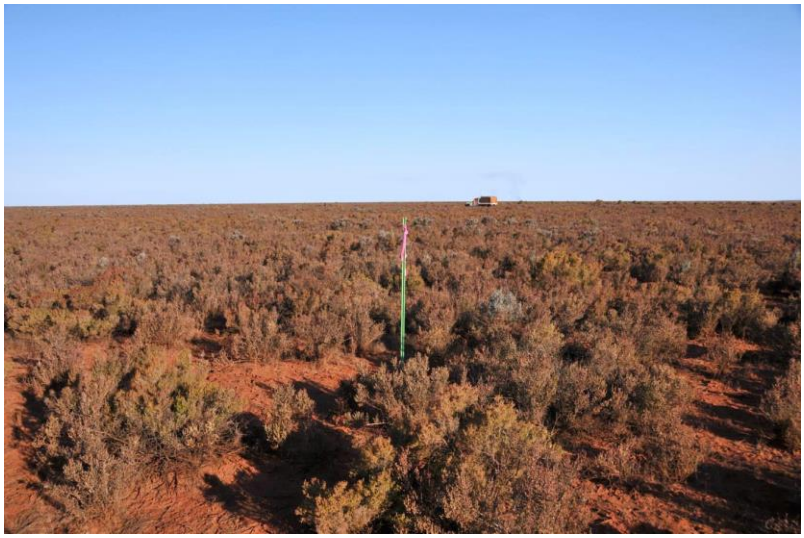
**Lat/Long (dd):** -22.37245015°S 119.3525042°E

**MGA Zone 50** 7 42236.9491 mE 7524053.512 mN

**Location:** On central-Northern margin of Fortescue Marsh, 10.2 km ESE of Minga Bore, 29.5 km N of Marillana Homestead, 29.4 km ESE of Kardardarrie Well, 11.1 km SW of Cloudbreak Mine Village.

**Vegetation:** Mid-dense shrubland of *Tecticornia indica* subsp. *bidens*, *Tecticornia auriculata* and *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) over very sparse grassland of *Eragrostis dielsii*.

**Site:** Margin of extensive saline flood plain and lake bed with surface fragments of grey-black metasedimentary rocks and BIF on deep (>0.5m), red orange-brown, loamy sand soils.



| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cyperus bulbosus* | 0% | 10-15% |
| *Eragrostis dielsii* | 5% | 5% |
| *Flaveria trinervia* | <1% | - |
| *Muellerolimon salicorniaceum* | <1% | <1% |
| *Nicotiana heterantha* | <1% | <1% |
| *Swainsona tanamiensis* | 0% | 5-8% |
| *Tecticornia auriculata* | 1% | 1% |
| *Tecticornia indica* subsp. *bidens* | 30-40% | 30-40% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | <1% | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | 15-20% (20) | 15-20% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT055

**Date established:** 13/09/2013 **Date rescored:** 21/07/2014

**Lat/Long (dd):** -22.42585033°S 119.6250823°E

**MGA Zone 50** 770214.2455 7517673.567 mN

**Location:** On central-Northern margin of Fortescue Marsh, 18.3 km WNW of Moorimordinia Pool, 10.7 km SSW of Karntama Village (Christmas Creek Mine), 32.1 km NE of Marillana Homestead, 38.4 km ESE of Minga Bore, 40.4 km WNW of Roy Hill Homestead.

**Vegetation:** Mid-dense shrubland of *Eremophila* spongiopcarpa and occasional *Senna artemisioides* subsp. *helmsii* over mid-dense shrubland of *Tecticornia indica* subsp. *bidens* and *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552), over very sparse plants of *Sida fibulifera*, *Eragrostis dielsii*, *Pterocaulon sphacelatum*, *Enteropogon ramosus*

**Site:** Stony flats on margin of stony plain (with some calcrete and ironstone colluvium/alluvium) and extensive saline flood plain with surface fragments of calcrete, BIF, metasediments. Very slightly rocky calcrete outcrop with shallow,red-brown, silty loam soils

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Abutilon* cryptopetalum | - | <1% |
| *Abutilon lepidum* | <1% | - |
| *Abutilon* oxycarpum subsp. Prostrate (A.A. Mitchell PRP 1266) . | <1% | <1% |
| *Angianthus cyathifer* | <1% | - |
| *Aristida contorta* | <1% | <1% |
| *Cenchrus ciliaris* | <1% | 2-3% |
| *Chloris pumilio* | <1% | <1% |
| *Chloris virgata* | <1% | 1-2 (5)% |
| *Dactyloctenium radulans* | - | <1% |
| *Enneapogon caerulescens* | <1% | <1% |
| *Enneapogon polyphyllus* | <1% | <1% |
| *Enteropogon ramosus* | <1% | 1% |
| *Eragrostis dielsii* | <1% | 1-2% |
| Eremophea cf. spinosa | <1% | <1% |
| *Eremophila spongiocarpa* | 30-35% | 30-35% |
| *Evolvulus alsinoides* var. *villosicalyx* | <1% | <1% |
| Gomphrena kanisii | <1% | - |
| *Ipomoea coptica* | - | <1% |
| *Lawrencia densiflora* | <1% | <1% |
| *Maireana luehmannii* | <1% | <1% |
| *Malvastrum americanum* | <1% | <1% |
| *Muellerolimon salicorniaceum* | <1% | <1% |
| *Nicotiana heterantha* | <1% | <1% |
| *Pluchea rubelliflora* | <1% | <1% |
| *Portulaca oleracea* | <1% | <1% |
| *Pterocaulon sphacelatum* | <1% | <1% |
| *Ptilotus nobilis* subsp. *nobilis* | <1% | - |
| *Sclerolaena densiflora* | <1% | <1% |
| *Senna artemisioides* subsp. *helmsii* | <1% | <1% |
| *Senna* sp. Meekatharra (E. Bailey 1-26) | <1% | <1% |
| *Sida fibulifera* | 2-3% | 2-3% |
| *Solanum lasiophyllum* | <1% | <1% |
| *Sporobolus australasicus* | <1% | <1% |
| *Sporobolus mitchellii* | 1% | 1% |
| *Streptoglossa decurrens* | <1% | <1% |
| *Swainsona kingii* | <1% | <1% |
| *Tecticornia indica* subsp. *bidens* | 35-45% | 35-45% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | <1% | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | 8-10% | 8-10% |
| *Trianthema triquetrum* | <1% | <1% |
| *Triraphis mollis* | <1% | - |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT056

**Date established:** 14/09/2013 **Date rescored:** not rescored

**Lat/Long (dd):** -22.45081902°S 119.644465°E

**MGA Zone 50** 772161.6642 mE 7514872.589 mN

**Location:** On central-Northern margin of Fortescue Marsh, 12.6 km SSW of Karntama Village (Christmas Creek Mine), 15.1 km WNW of Moorimordinia Pool, 31.6 km NE of Marillana Homestead, 37.3 km WNW of Roy Hill Homestead.

**Vegetation:** Sparse shrubland of *Tecticornia medusa* and *Tecticornia pergranulata* subsp. *pergranulata* over very sparse shrubland of *Cressa australis*.

**Site:** Edge of ephemeral lake bed on extensive saline flood plain with surface fragments of shells on deep (>0.5m), red-brown, loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cressa australis* | 1% | not rescored |
| *Tecticornia medusa* | 8-10% | not rescored |
| *Tecticornia pergranulata* subsp. *pergranulata* | 10-15% | not rescored |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT057

**Date established:** 14/09/2013 **Date rescored:** not rescored

**Lat/Long (dd):** -22.46944226°S 119.6537587

**MGA Zone 50**: 773082.1018 mE 7512792.655 mN

**Location:** On central-Northern area of Fortescue Marsh, 13.3 km WNW of Moorimordinia Pool, 14.5 km S of Karntama Village (Christmas Creek Mine), 31.1 km NE of Marillana Homestead, 35.5 km WNW of Roy Hill Homestead, 42.9 km ESE of Minga Bore.

**Vegetation:** Mid-dense shrubland of *Muellerolimon salicorniaceum* and *Tecticornia auriculata* over mid-dense plants of *Eragrostis dielsii* s.l. and *Tecticornia indica* subsp. *bidens* seedlings and occasional *Frankenia ambita*.

**Site:** Extensive saline flood plain and lake bed with surface fragments of shells on deep (>0.5m), red-brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cressa australis* | 2% | not rescored |
| *Eragrostis dielsii* | 5% | not rescored |
| *Frankenia ambita* | <1% | not rescored |
| *Muellerolimon salicorniaceum* | 20-25% | not rescored |
| *Tecticornia auriculata* | 1% | not rescored |
| *Tecticornia globulifera* | <1% | not rescored |
| *Tecticornia indica* subsp. *bidens* | 45% | not rescored |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | <1% | not rescored |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | <1% | not rescored |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT058

**Date established:** 14/09/2013 **Date rescored:** not rescored

**Lat/Long (dd):** -22.46342699°S 119.6479781°E

**MGA Zone 50** 772498.7323 mE 7513469.537 mN

**Location:** On central-Northern part of Fortescue Marsh, 13.9 km S of Karntama Village (Christmas Creek Mine), 14.2 km WNW of Moorimordinia Pool, 42 km ESE of Minga Bore, 31 km NE of Marillana Homestead.

**Vegetation:** Mid-dense shrubland of *Tecticornia auriculata*, *Atriplex flabelliformis* and *Tecticornia indica* subsp. *bidens* over sparse plants of *Cressa australis*, *Tecticornia indica* subsp. *bidens* seedlings and *Eragrostis dielsii*.

**Site:** Extensive saline flood plain and lake bed with surface fragments of shells on deep (>0.5m), red-brown, loam to loamy sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Atriplex flabelliformis* | 30-40% | not rescored |
| *Cressa australis* | 20-25% | not rescored |
| *Eragrostis dielsii* | <1% | not rescored |
| *Muellerolimon salicorniaceum* | <1% | not rescored |
| *Tecticornia auriculata* | 5% | not rescored |
| *Tecticornia globulifera* | <1% | not rescored |
| *Tecticornia indica* subsp. *bidens* | 10-15% | not rescored |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | <1% | not rescored |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | <1% | not rescored |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT059

**Date established:** 15/09/2013 **Date rescored:** not rescored

**Lat/Long (dd):** -22.46121375°S 119.646317°E

**MGA Zone 50** 772332.0324 mE 7513717.734 mN

**Location:** On central-Northern area of Fortescue Marsh, 14.4 km WNW of Moorimordinia Pool, 31.1 km NE of Marillana Homestead, 36.6 km WNW of Roy Hill Homestead, 41.8 km ESE of Minga Bore, 13.7 km S of Karntama Village (Christmas Creek Mine).

**Vegetation:** Mid-dense shrubland of *Tecticornia auriculata*, *Tecticornia indica* subsp. *Bidens*, *Tecticornia indica* subsp. *leiostachya* and *Tecticornia globulifera* over isolated plants of *Cressa australis*.

**Site:** Edge of ephemeral lake bed on extensive saline flood plain with surface fragments of shells on deep (>0.5m), red-brown, loam to loamy sand soils

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Atriplex flabelliformis* | <1% | not rescored |
| *Cressa australis* | <1% | not rescored |
| *Muellerolimon salicorniaceum* | <1% | not rescored |
| *Tecticornia auriculata* | 10-15% | not rescored |
| *Tecticornia globulifera* | 5% | not rescored |
| *Tecticornia indica* subsp. *bidens* | 15-20% | not rescored |
| *Tecticornia indica* subsp. *leiostachya* | 2% | not rescored |
| *Tecticornia medusa* | <1% | not rescored |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | <1% | not rescored |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | <1% | not rescored |
| *Tecticornia* verrucosa | <1% | not rescored |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT060

**Date established:** 15/09/2013 **Date rescored:** not rescored

**Lat/Long (dd):** -22.44343699°S 119.5963602°E

**MGA** **Zone 50** 767222.5545 mE 7515776.894 mN

**Location:** On central-Northern area of Fortescue Marsh, 13.9 km SW of Karntama Village (Christmas Creek Mine), 19.9 km WNW of Moorimordinia Pool, 28.6 km NE of Marillana Homestead, 36.3 km ESE of Minga Bore.

**Vegetation:** Mid-dense shrubland of *Tecticornia globulifera* and *Tecticornia pergranulata* subsp. *pergranulata*.

**Site:** Edge of ephemeral lake bed on extensive saline flood plain with surface fragments of shells on deep (>0.5m), red-brown, loamy sand to silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Tecticornia globulifera* | 25% | not rescored |
| *Tecticornia indica* subsp. *bidens* | <1% | not rescored |
| *Tecticornia pergranulata* subsp. *pergranulata* | 25% | not rescored |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | <1% | not rescored |
| *Tecticornia* verrucosa | <1% | not rescored |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT061

**Date established:** 15/09/2013 **Date rescored:** not rescored

**Lat/Long (dd):** -22.44112442 119.5904191°E

**MGA** **Zone 50** 766615.2125 mE 7516043.642 mN

**Location:** On central-Northern area of Fortescue Marsh, 14 km SW of Karntama Village (Christmas Creek Mine), 28.4 km NE of Marillana Homestead, 20.6 km WNW of Moorimordinia Pool, 35.6 km ESE of Minga Bore.

**Vegetation:** Mid-dense shrubland of *Muellerolimon salicorniaceum* over very sparse herbs of *Cressa australis*.

**Site:** Extensive saline flood plain and lake bed with surface fragments of shells and old Muellerolimon fruits on deep (>0.5m), red-brown, loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Atriplex* cf. semilunaris | <1% | not rescored |
| *Cressa australis* | 2-5% | not rescored |
| *Eragrostis* pergracilis | <1% | not rescored |
| *Heliotropium curassavicum* | <1% | not rescored |
| *Muellerolimon salicorniaceum* | 35-40% | not rescored |
| *Ptilotus nobilis* subsp. *nobilis* | <1% | not rescored |
| *Salsola australis* | <1% | not rescored |
| *Sclerolaena densiflora* | <1% | not rescored |
| *Sclerolaena lanicuspis* | <1% | not rescored |
| *Swainsona tanamiensis* | <1% | not rescored |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT062

**Date established:** 15/09/2013 **Date rescored:** not rescored

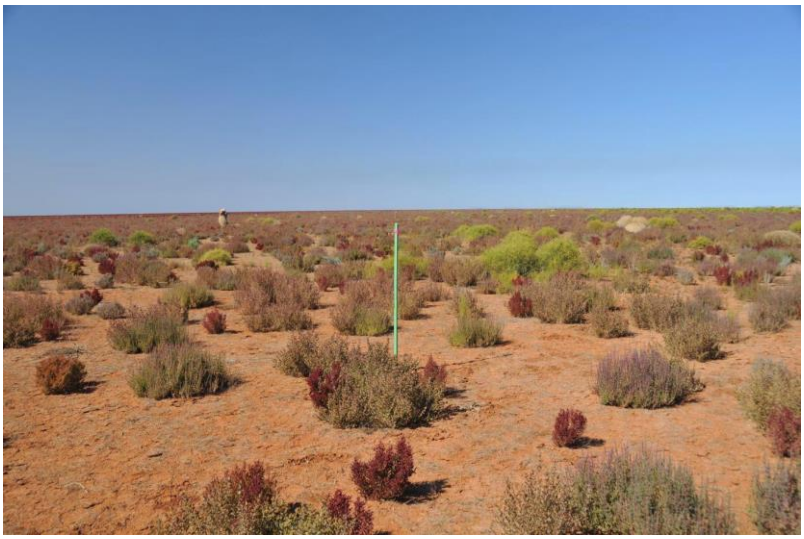
**Lat/Long (dd):** -22.43954703°S 119.5932863°E

MGA Zone 50 766913.4797 mE 7516213.272 mN

**Location:** On central-Northern margin of Fortescue Marsh, 13.7 km SW of Karntama Village (Christmas Creek Mine), 28.7 km NE of Marillana Homestead, 35.8 km ESE of Minga Bore, 20.4 km WNW of Moorimordinia Pool.

**Vegetation:** Scattered individual shrubs of *Muellerolimon salicorniaceum* over mid-dense shrubland of *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)*Tecticornia globulifera* and *Tecticornia indica* subsp. *bidens*.

**Site:** Extensive saline flood plain and lake bed with occasional surface fragments of shells and BIF on deep (>0.5m), red-brown, loam soils.



| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Atriplex flabelliformis* | <1% | not rescored |
| *Cressa australis* | 1-2% | not rescored |
| *Eragrostis dielsii* | <1% | not rescored |
| *Frankenia ambita* | <1% | not rescored |
| *Muellerolimon salicorniaceum* | <1% | not rescored |
| *Tecticornia auriculata* | <1% | not rescored |
| *Tecticornia globulifera* | 1% | not rescored |
| *Tecticornia indica* subsp. *bidens* | 10-15% | not rescored |
| *Tecticornia pergranulata* subsp. *pergranulata* | 2-5% | not rescored |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | 20% | not rescored |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | <1% | not rescored |
| *Tecticornia* verrucosa | <1% | not rescored |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT063

**Date established:** 16/09/2013 **Date rescored:** not rescored

**Lat/Long (dd):** -22.43372245°S 119.6237363°E

**MGA** **Zone 50** 770060.382 7516803.96 mN

**Location:** On central-Northern margin of Fortescue Marsh, 11.5 km SSW of Karntama Village (Christmas Creek Mine), 31.3 km NE of Marillana Homestead, 38.6 km ESE of Minga Bore, 17.9 km WNW of Moorimordinia Pool.

**Vegetation:** Mid-dense, low shrubland of *Tecticornia indica* subsp. *bidens*, *Tecticornia globulifera*, *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)& T. Colmer et al. KS 1) and *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) over isolated senescent plants of *Heliotropium curassavicum*.

**Site:** Edge of ephemeral lake bed on extensive saline flood plain with surface fragments of BIF, metasediments, shells on deep (>0.5m), red-brown, loamy sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Frankenia ambita* | <1% | not rescored |
| *Heliotropium curassavicum* | <1% | not rescored |
| *Tecticornia auriculata* | <1% | not rescored |
| *Tecticornia globulifera* | 2-5% | not rescored |
| *Tecticornia indica* subsp. *bidens* | 40% | not rescored |
| *Tecticornia indica* subsp. *leiostachya* | <1% | not rescored |
| *Tecticornia pergranulata* subsp. *pergranulata* | 1% | not rescored |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | 5-10% | not rescored |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | 2-5% | not rescored |
| *Tecticornia* verrucosa | <1% | not rescored |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT064

**Date established:** 16/09/2013 **Date rescored:** 21/07/2014

**Lat/Long (dd):** -22.43403979°S 119.6243042°E

MGA Zone 50 770118.247 mE 7516767.783 mN

**Location:** On central-Northern margin of Fortescue Marsh, 11.5 km SSW of Karntama Village (Christmas Creek Mine), 17.8 km WNW of Moorimordinia Pool, 31.4 km NE of Marillana Homestead, 38.6 km ESE of Minga Bore.

**Vegetation:** Mid-dense sedgeland and shrubland of *Typha domingensis*, *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) and *Muellerolimon salicorniaceum*, over sparse shrubs of *Tecticornia indica* subsp. *bidens*, and *Atriplex flabelliformis*, over mid-dense lower stratum of *Frankenia ambita*, *Sporobolus mitchellii*, *Eragrostis dielsii*, and seedlings of *Tecticornia indica* subsp. *bidens*, *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) and *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063).

**Site:** Near of calcrete platform at margin of extensive saline flood plain and lake bed with surface fragments of BIF, haematite and shells on deep (>0.5m), red-brown, loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Atriplex flabelliformis* | 2-5% | 5% |
| *Cressa australis* | <1% | <1% |
| *Cyperus bulbosus* | - | <1% |
| *Eleocharis papillosa* | - | 25-30% |
| *Eragrostis dielsii* | 5-10% | 0% |
| *Frankenia ambita* | 10-15% | 2% |
| *Heliotropium curassavicum* | - | 5% |
| *Mimulus* aff *gracilis* | - | 15-20% |
| *Muellerolimon salicorniaceum* | 20-25% | 20-25% |
| *Nicotiana heterantha* | 2% | 15% |
| *Pluchea rubelliflora* | <1% | 0% |
| *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) | 15% | 15% |
| Schoenoplectus dissachanthus | - | <1% |
| *Sporobolus mitchellii* | 8% (5-8%) | 8-10% |
| *Swainsona tanamiensis* | - | 25% |
| *Tecticornia* sp. sterile | | |
| *Tecticornia globulifera* | <1% | <1% |
| *Tecticornia indica* subsp. *bidens* | 30-40% | 5-8% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | 15-20% | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | 5% | <1% |
| *Triglochin hexagona* | - | 2-5% |
| *Typha domingensis* | 5-(8)% | 5-(8)% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT065

**Date established:** 17/09/2013 **Date rescored:** not rescored

**Lat/Long (dd):** -22.43366646°S 119.621351°E

**MGA** **Zone 50** 769814.8478 mE 7516814.456 mN

**Location:** On central-Northern margin of Fortescue Marsh, 11.6 km SSW of Karntama Village (Christmas Creek Mine), 18.1 km WNW of Moorimordinia Pool, 31.2 km NE of Marillana Homestead, 38.3 km ESE of Minga Bore.

**Vegetation:** Mid-dense shrubland of *Tecticornia pergranulata* subsp. *pergranulata* and *Tecticornia globulifera* over sparse plants of *Tecticornia* verrucosa.

**Site:** Extensive saline flood plain and lake bed with surface fragments of BIF, haematite, shells and associated metasediments on deep (>0.5m), red-brown , silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Tecticornia auriculata* | <1% | not rescored |
| *Tecticornia globulifera* | 10-12% | not rescored |
| *Tecticornia indica* subsp. *bidens* | <1% | not rescored |
| *Tecticornia pergranulata* subsp. *pergranulata* | 20-25% | not rescored |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | <1% | not rescored |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | 2% | not rescored |
| *Tecticornia* verrucosa | 1-2% | not rescored |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT066

**Date established:** 15/06/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.42816516°S 119.095484°E

**MGA** **Zone 50** 715676.6372 mE 7518274.732 mN

**Location:** On SW side of Fortescue Marsh, 11.9 km SE of Cowra Line Camp, 15.5 km S of Kardardarrie Well, 2 km NE of Mingah Well, 37.2 km WSW of Cloudbreak Mine Village, 39.4 km NW of Marillana Homestead.

**Vegetation:** Very sparse shrubland of *Melaleuca glomerata* and *Stylobasium spathulatum* over dense hummock grassland of *Triodia longiceps*, with occasional shrubs of *Senna artemesioides* subsp *helmsii*, *Corchorus sidoides* subsp *sidoides* and *Ptilotus obovatus*, over sparse tussock grasses of *Cenchrus ciliaris* and shrubs of *Sida fibulifera*, Melhania

**Site:** Extensive, flat calcrete plain with surface fragments of calcrete. Very slightly rocky calcrete outcrop with deep (>0.5m), red -> pale red-brown, loamy sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Abutilon lepidum* | not scored | <1% |
| *Acacia bivenosa* x *sclerosperma* subsp. | not scored | <1% |
| *Acacia tetragonophylla* | not scored | <1% |
| *Atriplex codonocarpa* | not scored | <1% |
| *Bidens bipinnata* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | 15-20% |
| *Cleome viscosa* | not scored | <1% |
| *Convolvulus clementii* | not scored | <1% |
| *Corchorus sidoides* subsp. *sidoides* | not scored | <1% |
| *Cucumis melo* | not scored | <1% |
| *Cucumis variabilis* | not scored | <1% |
| *Enchylaena tomentosa* var. *tomentosa* | not scored | <1% |
| *Enneapogon caerulescens* | not scored | <1% |
| *Enneapogon polyphyllus* | not scored | <1% |
| *Eragrostis dielsii* | not scored | <1% |
| *Eremophila forrestii* subsp. *forrestii* | not scored | <1% |
| *Eremophila longifolia* | not scored | <1% |
| *Euphorbia biconvexa* | not scored | <1% |
| *Euphorbia* sp. sterile (boop/tannensis?) | not scored | <1% |
| *Euphorbia vaccaria* var. *erucoides* | not scored | <1% |
| *Evolvulus alsinoides* var. *villosicalyx* | not scored | <1% |
| *Goodenia forrestii* | not scored | <1% |
| *Heliotropium chrysocarpum* | not scored | <1% |
| *Hibiscus sturtii* var. *campylochlamys* | not scored | <1% |
| *Maireana triptera* | not scored | <1% |
| *Melaleuca glomerata* | not scored | 10-15% |
| *Melhania oblongifolia* | not scored | <1% |
| *Pluchea dunlopii* | not scored | <1% |
| *Pluchea ferdinandi-muelleri* | not scored | <1% |
| *Pterocaulon sphacelatum* | not scored | <1% |
| *Ptilotus nobilis* subsp. *nobilis* | not scored | <1% |
| *Ptilotus obovatus* | not scored | <1% |
| *Rhagodia eremaea* | not scored | <1% |
| *Rhynchosia australis* | not scored | <1% |
| *Scaevola spinescens* | not scored | <1% |
| *Sclerolaena costata* | not scored | <1% |
| *Senna artemesioides helmsii* x *oligophylla* | not scored | <1% |
| *Senna glutinosa* subsp. *glutinosa* | not scored | <1% |
| *Sida arsiniata* | not scored | <1% |
| *Sida fibulifera* | not scored | <1% |
| *Solanum morrisonii* | not scored | <1% |
| *Sporobolus australasicus* | not scored | <1% |
| *Stemodia grossa* | not scored | <1% |
| *Stylobasium spathulatum* | not scored | 1% |
| *Trichodesma zeylanicum* var. *zeylanicum* | not scored | <1% |
| *Triodia longiceps* | not scored | 70-75% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT067

**Date established:** 16/06/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.38292082°S 119.1806351°E

**MGA** **Zone 50** 724516.4566 mE 7523160.611 mN

**Location:** On central-west area of Fortescue Marsh, 8.4 km E of Cowra Line Camp, 14.6 km SE of Kardardarrie Well, 12 km ENE of Mingah Well, 27.3 km WSW of Cloudbreak Mine Village, 36.3 km NW of Marillana Homestead.

**Vegetation:** Sparse shrubland of *Muellerolimon salicorniaceum* and *Tecticornia auriculata* over mid-dense shrubs of *Eragrostis* per*gracilis* and *Eragrostis dielsii*, with occasional *Swainsona kingii*, *Cyperus bulbosus* and *Frankenia ambita* (seedlings).

**Site:** Extensive saline flood plain and lake bed with deep (>0.5m), red-brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cyperus bulbosus* | not scored | 2-5% |
| *Eleocharis papillosa* | not scored | <1% |
| *Eragrostis dielsii* | not scored | 75-80% |
| *Eragrostis* per*gracilis* | not scored | 75-80% |
| *Frankenia ambita* | not scored | <1% |
| *Heliotropium curassavicum* | not scored | <1% |
| *Maireana luehmannii* | not scored | <1% |
| *Mimulus* aff *gracilis* | not scored | 1% common |
| *Muellerolimon salicorniaceum* | not scored | 5-8% |
| *Nicotiana heterantha* | not scored | <1% |
| *Swainsona tanamiensis* | not scored | <1% common |
| *Tecticornia auriculata* | not scored | 2-5% |
| *Tecticornia globulifera* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT068

**Date established:** 16/06/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.38724228°S 119.176287°E

MGA Zone 50724061.6981 mE 7522688.503 mN

**Location:** On central-west area of Fortescue Marsh, 18 km E of Cowra Line Camp, 14.6 km SE of Kardardarrie Well, 11.9 km SW of Minga Bore, 36.2 km NW of Marillana Homestead, 27.9 km WSW of Cloudbreak Mine Village.

**Vegetation:** Mid-dense shrubland of *Tecticornia indica* subsp *bidens*, *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)& T. Colmer et al. KS 1063) and *Tecticornia auriculata* over mid-dense grassland of *Eragrostis* per*gracilis*.

**Site:** Extensive saline flood plain and lake bed with deep (>0.5m), red-brown- pale coffee at surface, salt crust on surface, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cyperus bulbosus* | not scored | <1% |
| *Dysphania congestiflora* | not scored | <1% |
| *Eragrostis* per*gracilis* | not scored | 40-50% |
| *Muellerolimon salicorniaceum* | not scored | <1% |
| *Nicotiana heterantha* | not scored | 1% |
| *Ptilotus nobilis* subsp. *nobilis* | not scored | <1% |
| *Tecticornia auriculata* | not scored | 2-5% |
| *Tecticornia indica* subsp. *bidens* | not scored | 15-25% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)& J. English KS 552) | not scored | 15-20% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT069

**Date established:** 16/06/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.42292161°S 119.1698215°E

**MGA** **Zone 50** 723338.7479 mE 7518746.705 mN

**Location:** On central-west area of Fortescue Marsh, 18.4 km ESE of Cowra Line Camp, 17.4 km SSE of Kardardarrie Well, 9.2 km ENE of Mingah Well, 30 km WSW of Cloudbreak Mine Village, 33.8 km NW of Marillana Homestead.

**Vegetation:** Very sparse shrubland (to isolated plants) of *Eremophila spongiocarpa* over mid-dense shrubland of *Tecticornia indica* subsp. *bidens*, Scaevola collaris and *Eragrostis dielsii* over dense soil surface liverwort crust.

**Site:** Extensive saline flood plain and lake bed Slight surface exposure of calcrete deposits in middle of plain with shallow, red-brown , loamy sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cenchrus ciliaris* | not scored | <1% |
| *Dactyloctenium radulans* | not scored | <1% |
| Dysphania simulans | not scored | <1% |
| *Eragrostis dielsii* | not scored | 8-10% |
| *Eremophila spongiocarpa* | not scored | 1% |
| *Flaveria trinervia* | not scored | <1% |
| *Frankenia ambita* | not scored | <1% |
| *Nicotiana heterantha* | not scored | <1% |
| Scaevola collaris | not scored | 1% |
| *Tecticornia auriculata* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 45-50% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | 1-2% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT070

**Date established:** 17/06/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.41869445°S 119.1691203°E

**MGA** **Zone 50** 723273.309 mE 7519215.9 mN

**Location:** On central-west area of Fortescue Marsh, 9.2 km ENE of Mingah Well, 14.8 km SW of Minga Bore, 18.1 km ESE of Cowra Line Camp, 17 km SSE of Kardardarrie Well, 29.9 km WSW of Cloudbreak Mine Village, 34.2 km NW of Marillana Homestead.

**Vegetation:** Sparse chenopod shrubland of *Tecticornia indica* subsp. *bidens* and *Tecticornia auriculata*, over very sparse grassland of *Eragrostis* per*gracilis* and *Eragrostis dielsii* over sparse liverwort soil crust.

**Site:** Extensive saline flood plain and lake bed with surface fragments of calcrete on shallow, , silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cyperus bulbosus* | not scored | <1% |
| *Dactyloctenium radulans* | not scored | <1% |
| *Eragrostis dielsii* | not scored | 5% - 8% |
| *Eragrostis* per*gracilis* | not scored | 5% - 8% |
| *Maireana luehmannii* | not scored | <1% |
| *Tecticornia auriculata* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 25-30(35)% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT071

**Date established:** 17/06/2014 **Date rescored:** not rescored

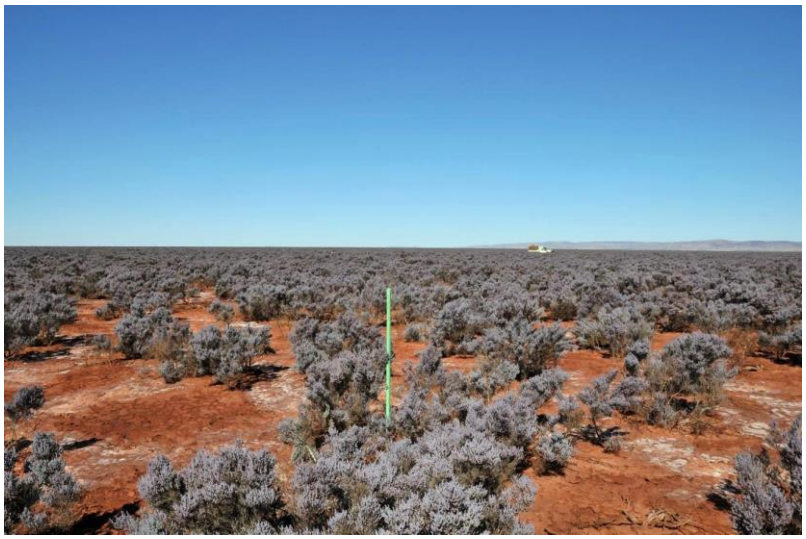
**Lat/Long (dd):** -22.42635677°S 119.1413677°E

**MGA** **Zone 50** 720403.6051 mE 7518408.336 mN

**Location:** On central-west area of Fortescue Marsh. 6.2 km ENE of Mingah Well, 16.4 km SSE of Kardardarrie Well, 32.8 km WSW of Cloudbreak Mine Village, 35.7 km NW of Marillana Homestead.

**Vegetation:** Mid-dense chenopod shrubland of *Tecticornia auriculata* over isolated plants of *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) and *Tecticornia indica* subsp. *bidens*.

**Site:** Extensive saline flood plain and lake bed with deep (>0.5m), red-brown , silty loam soils.



| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Tecticornia auriculata* | not scored | 45-50% |
| *Tecticornia indica* subsp. *bidens* | not scored | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT072

**Date established:** 17/06/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.43629033°S 119.1314093°E

**MGA** **Zone 50** 719362.6542 mE 7517322.82 mN

**Location:** On central-west margin of Fortescue Marsh, 5 km E of Mingah Well, 15.4 km ESE of Cowra Line Camp, 17.1 km SSE of Kardardarrie Well, 35.8 km NW of Marillana Homestead, 34.2 km WSW of Cloudbreak Mine Village.

**Vegetation:** Isolated plants of *Muellerolimon salicorniaceum* and occasional shrubs of *Tecticornia auriculata*, over mid-dense shrubland of *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) and *Tecticornia indica* subsp. *bidens*,over isolated clumps of *Cyperus bulbosus*.

**Site:** Extensive saline flood plain and lake bed with surface fragments of calcrete on deep (>0.5m), red-brown- pale RB/coffee, loamy sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cyperus bulbosus* | not scored | 1% |
| *Eragrostis* per*gracilis* | not scored | <1% |
| *Lawrencia* glomerata | not scored | <1% |
| *Maireana luehmannii* | not scored | <1% |
| *Muellerolimon salicorniaceum* | not scored | <1% |
| *Sporobolus australasicus* | not scored | <1% |
| *Tecticornia auriculata* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 10-12% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | 30-35% |
| *Trianthema* aff. *triquetrum* | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT073

**Date established:** 17/06/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.44415943°S 119.1279394°E

**MGA** **Zone 50** 718993.062 mE 7516456.416 mN

**Location:** On central-west margin of Fortescue Marsh, 4.6 km E of Mingah Well, 15.6 km SE of Cowra Line Camp, 17.8 km SSE of Kardardarrie Well, 34.9 km WSW of Cloudbreak Mine Village, 35.6 km NW of Marillana Homestead.

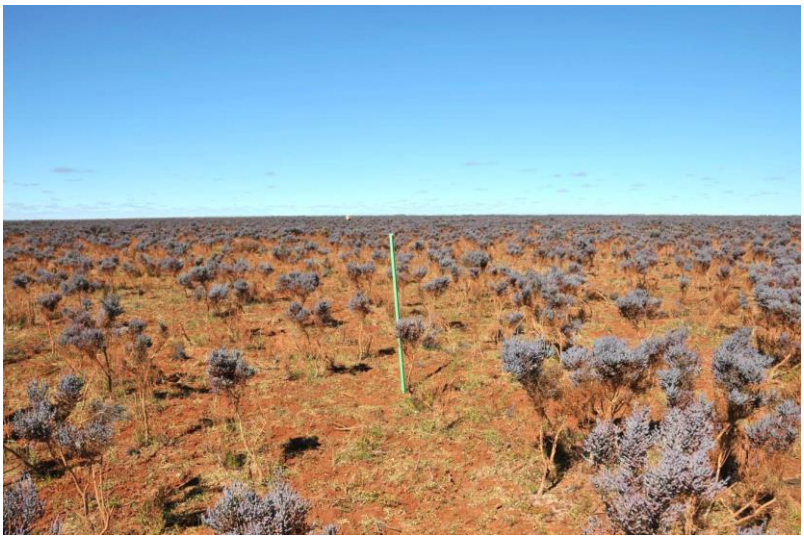
**Vegetation:** Very sparse - isolated shrubs of *Acacia bivenosa* and *Acacia synchronicia*, over mid-dense shrubland of *Eremophila spongiocarpa*, *Tecticornia auriculata*, *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552), *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)& T. Colmer et al. KS 1063) and *Tecticornia indica* subsp. *bidens*, over

**Site:** Margin of extensive saline flood plain and lake bed adjacent to calcrete plain with surface fragments of calcrete on shallow, red- brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Abutilon* fraseri subsp. fraseri | not scored | <1% |
| *Acacia bivenosa* x *sclerosperma* subsp. *sclerosperma* | not scored | 1-2% |
| *Acacia synchronicia* | not scored | 2% |
| *Acacia tetragonophylla* | not scored | <1% |
| *Atriplex amnicola* | not scored | <1% |
| *Atriplex bunburyana* | not scored | <1% |
| *Dactyloctenium radulans* | not scored | 0.5% common |
| *Dichanthium sericeum* subsp. *humilius* | not scored | <1% |
| *Enchylaena tomentosa* var. *tomentosa* | not scored | <1% |
| *Enneapogon caerulescens* | not scored | <1% |
| *Enneapogon polyphyllus* | not scored | <1% |
| *Eragrostis dielsii* | not scored | 8-10% |
| *Eremophea spinosa* | not scored | <1% common |
| *Eremophila spongiocarpa* | not scored | 10-12% |
| *Euphorbia biconvexa* | not scored | <1% |
| Euphorbia sp. sterile cf. tannensis | not scored | <1% |
| *Goodenia forrestii* | not scored | <1% |
| *Lawrencia* glomerata | not scored | <1% |
| *Maireana luehmannii* | not scored | <1% |
| *Scaevola spinescens* | not scored | <1% |
| *Senna artemisioides* subsp. *oligophylla* | not scored | <1% |
| *Senna glaucifolia* | not scored | <1% |
| *Sida fibulifera* | not scored | <1% |
| *Sporobolus australasicus* | not scored | <1% |
| *Streptoglossa bubakii* | not scored | <1% common |
| *Streptoglossa tenuiflora* | not scored | <1% |
| *Tecticornia auriculata* | not scored | 10-12% |
| *Tecticornia globulifera* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 10-12% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | not scored | 2% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | 5-2% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT074



**Date established:** 14/07/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.59509797°S 119.8329647°E

**MGA** **Zone 50** 791269.4827 mE 7498533.407 mN

**Location:** On SE part of Fortescue Marsh, 5.6 km SW of 14 Mile Pool, 12.5 km W of Roy Hill summit, 32.8 km SSE of Karntama Village (Christmas Creek Mine), 43.9 km E of Marillana Homestead, 14.3 km NW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Mid-dense shrubland of *Tecticornia auriculata* over mid-dense herbfield of *Cressa australis*, *Mimulus* aff. *gracilis*, *Nicotiana heterantha*, *Heliotropium curassavicum* and *Trigonella suavissima*

**Site:** Extensive saline flood plain and lake bed with deep (>0.5m), red-brown , silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Angianthus cyathifer* | not scored | <1% |
| *Cressa australis* | not scored | 20-25% |
| *Cyperus bulbosus* | not scored | < 1% - 2-5% |
| *Eleocharis papillosa* | not scored | <1% |
| *Heliotropium curassavicum* | not scored | 1-2% |
| *Mimulus* aff *gracilis* | not scored | <1% |
| *Nicotiana heterantha* | not scored | 1% |
| *Swainsona tanamiensis* | not scored | <1% |
| *Tecticornia auriculata* | not scored | 35-45% |
| *Tecticornia medusa* | not scored | <1% |
| *Tecticornia pergranulata* subsp. *pergranulata* | not scored | 2-5% |
| *Trigonella suavissima* | not scored | 25-30% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT075

**Date established:** 14/07/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.59912464°S 119.8359118°E

**MGA** Zone 50 791564.1684 mE 7498081.523 mN

**Location:** On SE part of Fortescue Marsh, 12.2 km W of Roy Hill summit, 33.3 km SSE of Karntama Village (Christmas Creek Mine), 44.2 km E of Marillana Homestead, 13.8 km WNW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Mid-dense shrubland of *Tecticornia medusa* and *Tecticornia pergranuata* subsp. *pergranulata* over sparse herbs of *Cressa australis* and *Mimulus* aff. *gracilis*.

**Site:** Edge of ephemeral lake bed on extensive saline flood plain with deep (>0.5m), red-brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cressa australis* | not scored | 10-8% |
| *Mimulus* aff *gracilis* | not scored | 1% |
| *Tecticornia auriculata* | not scored | <1% |
| *Tecticornia medusa* | not scored | 10-15% |
| *Tecticornia pergranulata* subsp. *pergranulata* | not scored | 20-25% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT076

**Date established:** 14/07/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.60193626°S 119.8389282°E

**MGA** **Zone 50** 791868.532 mE 7497764.111 mN

**Location:** On SE part of Fortescue Marsh, 11.9 km W of Roy Hill summit, 12.4 km W of Roy Hill Homestead, 33.7 km SSE of Karntama Village (Christmas Creek Mine), 13.4 km WNW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Mid-dense shrubland of *Tecticornia medusa* and *Tecticornia pergranulata* subsp. *pergranulata* over isolated seedlings of *Tecticornia medusa* and *Tecticornia pergranulata* subsp. *pergranulata* and herbs of *Cressa australis*.

**Site:** Edge of ephemeral lake bed on extensive saline flood plain with deep (>0.5m), red-brown, loamy sand soils.

]

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cressa australis* | not scored | <1% |
| *Tecticornia medusa* | not scored | 15-20% |
| *Tecticornia pergranulata* subsp. *pergranulata* | not scored | 15-20% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT077

**Date established:** 16/07/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.61553439°S 119.830524°E

**MGA** **Zone 50** 790975.3661 mE 7496274.025 mN

**Location:** On SE margin of Fortescue Marsh, 12.8 km W of Roy Hill summit, 13.1 km W of Roy Hill Homestead, 34.6 km SSE of Karntama Village (Christmas Creek Mine), 43.5 km E of Marillana Homestead, 13.4 km WNW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Mid-dense shrubland of *Tecticornia auriculata*, *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)*Eremophila spongiocarpa*, *Tecticornia indica* subsp. *bidens* and *Tecticornia indica* subsp. *leiostachya*, over

mid-dense grassland of *Eragrostis dielsii* and herbs of *Cleome viscosa*, *Bulbostylis barbata*, over very sparse herbs of

**Site:** Low (1m), elongate sandy ridge deposited on margin of extensive saline flood plain, near calcrete plain with deep (>0.5m), orange- red-brown, sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Angianthus cyathifer* | not scored | <1% |
| *Bulbostylis barbata* | not scored | <1% |
| *Cleome viscosa* | not scored | <1% |
| *Cressa australis* | not scored | <1% |
| *Cyperus bulbosus* | not scored | <1% |
| *Dactyloctenium radulans* | not scored | <1% |
| *Dysphania plantaginella* | not scored | <1% |
| *Eragrostis dielsii* | not scored | 40% |
| *Eremophila spongiocarpa* | not scored | 2-5% |
| Eriachne aristidea | not scored | <1% |
| *Frankenia ambita* | not scored | <1% |
| *Gomphrena affinis* subsp. *pilbarensis* | not scored | <1% |
| *Ipomoea coptica* | not scored | <1% |
| *Maireana luehmannii* | not scored | <1% |
| *Muellerolimon salicorniaceum* | not scored | <1% |
| *Nicotiana heterantha* | not scored | <1% |
| *Pluchea rubelliflora* | not scored | <1% |
| *Portulaca filifolia* | not scored | <1% |
| *Portulaca oleracea* | not scored | <1% |
| *Sida fibulifera* | not scored | <1% |
| *Sporobolus australasicus* | not scored | <1% |
| *Streptoglossa bubakii* | not scored | <1% |
| *Swainsona tanamiensis* | not scored | 1-2 -(5%) |
| *Tecticornia auriculata* | not scored | 20-25% |
| *Tecticornia indica* subsp. *bidens* | not scored | <1% |
| *Tecticornia indica* subsp. *leiostachya* | not scored | <1% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | not scored | 5-8% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | 2-5% |
| *Trianthema triquetrum* | not scored | <1% |
| *Trianthema turgidifolium* | not scored | <1% |
| *Triglochin hexagona* | not scored | <1% |
| *Triodia longiceps* | not scored | <1% |
| *Triraphis mollis* | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT078

**Date established:** 16/07/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.62048424°S 119.8291963°E

**MGA** **Zone 50** 790828.3788 mE 7495728.227 mN

**Location:** On SE margin of Fortescue Marsh, 13 km W of Roy Hill summit, 35 km SSE of Karntama Village (Christmas Creek Mine), 43.3 km E of Marillana Homestead, 13.3 km WNW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Sparse *Melaleuca glomerata* shrubland over mid-dense *Triodia longiceps* hummock grassland and occasional shrubs of *Maireana pyramidata*, *Scaevola spinescens* and *Chenopodium gaudichaudianum*, over isolated clumps of *Bulbostylis barbata*, *Cenchrus ciliaris* and *Paspalidium reflexum*.

**Site:** Red aeolian sand dune deposits on calcrete plain, near saline flood plain with surface fragments of sand on deep (>0.5m), red sand, sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Abutilon otocarpum* | not scored | <1% |
| *Aristida contorta* | not scored | <1% |
| *Boerhavia coccinea* | not scored | <1% |
| *Bulbostylis barbata* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | 1-2 (5)% |
| *Chenopodium gaudichaudianum* | not scored | <1% |
| *Cleome viscosa* | not scored | <1% |
| *Enchylaena tomentosa* var. *tomentosa* | not scored | <1% |
| *Eragrostis eriopoda* | not scored | <1% |
| *Hibiscus brachychlaenus* | not scored | <1% |
| *Indigofera colutea* | not scored | <1% |
| *Maireana pyramidata* | not scored | 1% |
| *Melaleuca glomerata* | not scored | 25-30% |
| *Paspalidium reflexum* | not scored | <1% common |
| *Rhagodia eremaea* | not scored | <1% |
| *Salsola australis* | not scored | <1% |
| *Scaevola spinescens* | not scored | <1% |
| *Senna artemisioides* subsp. *helmsii* | not scored | <1% |
| *Tecticornia auriculata* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | <1% |
| *Tecticornia indica* subsp. *leiostachya* | not scored | <1% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | not scored | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | <1% |
| *Tribulus occidentalis* | not scored | <1% |
| *Triodia longiceps* | not scored | 40-45% |
| *Vachellia farnesiana* | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT079

**Date established:** 17/07/2014 **Date rescored:** not rescored

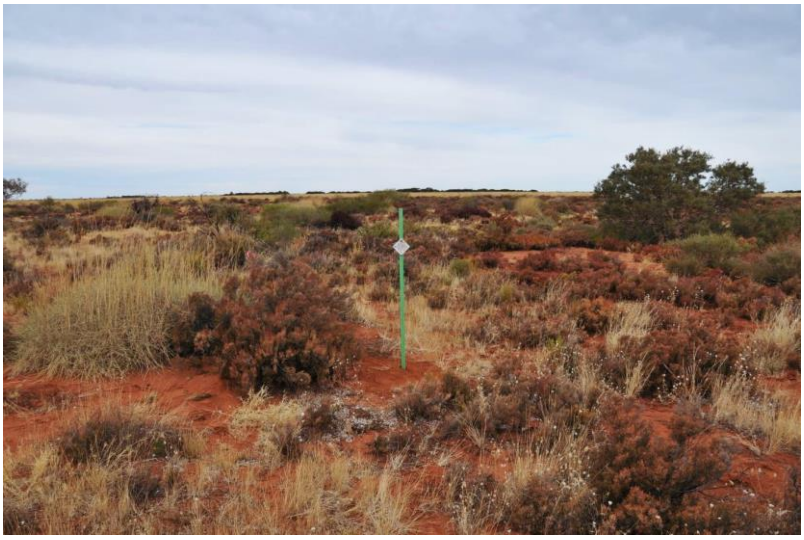
**Lat/Long (dd):** -22.62623842°S 119.8361692°E

**MGA** **Zone 50** 791533.427 mE 7495077.068 mN

**Location:** On SE margin of Fortescue Marsh, 12.5 km W of Roy Hill Homestead, 12.4 km WSW of Roy Hill summit, 35.9 km SSE of Karntama Village (Christmas Creek Mine), 44 km E of Marillana Homestead, 12.4 km WNW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Very sparse shrubland of *Eremophila spongiocarpa*, *Melaleuca glomerata*, *Acacia sclerosperma* and *Acacia synchronicia*, over mid-dense shrubland of *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552), *Tecticornia indica* subsp. *bidens*, *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)& T. Colmer et al. KS 1063) and

**Site:** Loamy sandy flats adjacent to sand dune deposits near margin of extensive saline flood plain and lake bed with deep (>0.5m), orange-brown, loamy sand soils.



| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Acacia sclerosperma* subsp. *sclerosperma* | not scored | 1% |
| *Acacia synchronicia* | not scored | <1% |
| *Aerva javanica* | not scored | <1% |
| *Atriplex bunburyana* | not scored | <1% |
| *Atriplex codonocarpa* | not scored | <1% |
| *Atriplex flabelliformis* | not scored | <1% |
| *Boerhavia coccinea* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | <1% |
| *Dactyloctenium radulans* | not scored | 5% |
| *Einadia nutans* subsp. *eremaea* | not scored | <1% |
| *Enchylaena tomentosa* var. *tomentosa* | not scored | <1% |
| *Enneapogon caerulescens* | not scored | 5% |
| *Enneapogon polyphyllus* | not scored | 5% |
| *Eragrostis dielsii* | not scored | 10-15% |
| *Eremophea spinosa* | not scored | <1% |
| *Eremophila spongiocarpa* | not scored | 2-5% |
| *Gomphrena affinis* subsp. *pilbarensis* | not scored | <1% |
| *Goodenia forrestii* | not scored | <1% |
| *Lawrencia densiflora* | not scored | <1% |
| *Lotus cruentus* | not scored | <1% |
| *Maireana amoena* | not scored | <1% |
| *Maireana luehmannii* | not scored | <1% |
| *Malvastrum americanum* | not scored | <1% |
| *Melaleuca glomerata* | not scored | S |
| *Nicotiana heterantha* | not scored | <1% |
| *Ptilotus nobilis* subsp. *nobilis* | not scored | <1% |
| *Salsola australis* | not scored | <1% |
| *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) | not scored | <1% |
| *Scaevola spinescens* | not scored | <1% |
| *Sclerolaena* aff. *densiflora* | not scored | <1% |
| *Senna* glutinosa subsp. glutinosa | not scored | <1% |
| *Sida fibulifera* | not scored | <1% |
| *Solanum lasiophyllum* | not scored | <1% |
| *Sporobolus australasicus* | not scored | 1% |
| *Streptoglossa bubakii* | not scored | 1% |
| *Swainsona kingii* | not scored | <1% |
| *Tecticornia auriculata* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 1-2% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | not scored | 1-2% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | 20-25% |
| *Trianthema triquetrum* | not scored | <1% |
| *Triodia longiceps* | not scored | 1% |
| *Triraphis mollis* | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT080

**Date established:** 20/07/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.40062349°S 119.4713842°E

**MGA** **Zone 50** 754432.0088 mE 7520736.555 mN

Location : On N margin of Fortescue Marsh, 11.4 km SSE of Cloudbreak Mine Village, 26.6 km NNE of Marillana Homestead, 22.6 km ESE of Minga Bore, 54.5 km WNW of Roy Hill summit.

**Vegetation:** Mid-dense *Melaleuca glomerata* shrubland over very sparse shrubs of *Tecticornia indica* subsp. *bidens*, *Duma florulenta* and *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) and *Tecticornia* sp. Christmas Creek

(K.A. Shepherd & T. Colmer et al. KS 1063) over dense grassland of *Sporobolus mitchellii* and herbfield of Cullen

**Site:** Gravelley flats on margin of saline flood plain and lake bed with surface fragments of BIF & associated metasediments on deep (>0.5m), pale red-brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Acacia stenophylla* | not scored | <1% |
| *Acacia synchronicia* | not scored | <1% |
| *Alternanthera nodiflora* | not scored | <1% |
| *Bidens bipinnata* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | <1% |
| *Centipeda minima* subsp. *macrocephala* | not scored | <1% |
| *Cullen cinereum* | not scored | <1% |
| *Duma florulenta* | not scored | 1% |
| *Enchylaena tomentosa* var. *tomentosa* | not scored | <1% |
| *Enteropogon ramosus* | not scored | <1% |
| *Eragrostis cumingii* | not scored | <1% |
| *Eragrostis dielsii* | not scored | <1% |
| *Eragrostis leptocarpa* | not scored | <1% |
| *Eragrostis tenellula* | not scored | <1% |
| *Eremophila spongiocarpa* | not scored | <1% |
| *Flaveria trinervia* | not scored | <1% |
| *Lotus cruentus* | not scored | <1% |
| *Malvastrum americanum* | not scored | <1% |
| *Marsilea hirsuta* | not scored | <1% |
| *Melaleuca glomerata* | not scored | 45-50% |
| *Muellerolimon salicorniaceum* | not scored | <1% |
| *Neptunia dimorphantha* | not scored | <1% |
| *Nicotiana heterantha* | not scored | <1% |
| *Paspalidium aff. jubiflorum* | not scored | <1% |
| *Pluchea dunlopii* | not scored | <1% |
| *Pluchea rubelliflora* | not scored | <1% |
| *Pterocaulon sphacelatum* | not scored | <1% |
| *Ptilotus nobilis* subsp. *nobilis* | not scored | <1% |
| *Ptilotus obovatus* | not scored | <1% |
| *Rhynchosia australis* | not scored | <1% |
| *Rostellularia adscendens* var. *clementii* | not scored | <1% |
| *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) | not scored | 1-2% |
| *Sesbania cannabina* | not scored | <1% |
| *Sida fibulifera* | not scored | <1% |
| *Solanum morrisonii* | not scored | <1% |
| *Sporobolus australasicus* | not scored | <1% |
| *Sporobolus caroli* | not scored | <1% |
| *Sporobolus mitchellii* | not scored | 80-85% |
| *Streptoglossa bubakii* | not scored | <1% |
| *Swainsona kingii* | not scored | <1% |
| *Tecticornia auriculata* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 10-15% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | not scored | 1-2% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | <1% |
| *Vachellia farnesiana* | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT081

**Date established:** 20/07/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.38664683°S 119.4303142°E

**MGA** **Zone 50** 750227.0082 mE 7522353.641 mN

**Location:** On N margin of Fortescue Marsh, 18.1 km ESE of Minga Bore, 9.1 km S of Cloudbreak Mine Village, 27.4 km N of Marillana Homestead, 44.1 km E of Cowra Line Camp.

**Vegetation:** Sparse shrubland of *Acacia synchronicia* and *Eremophila youngii* over sparse shrubland of *Atriplex amnicola*, *Acacia synchronicia*, *Maireana pyramidata*, over mid-dense subshrubs, forbs and grasses of *Maireana platycarpa*, *Lepidium platypetalum*, *Sclerolaena diacantha*, *Sida fibulifera*, *Eragrostis dielsii*, *Sporobolus australasicus*, *Streptoglossa bubakii* and *Cenchrus ciliaris*.

**Site:** Ephemeral creekline and alluvial fan on edge of saline flood plain with surface fragments of BIF & associated metasediments on shallow, red-brown, loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Abutilon lepidum* | not scored | <1% |
| *Acacia synchronicia* | not scored | 25-30% |
| *Acacia synchronicia* / A. robeorum | not scored | <1% |
| *Acacia tetragonophylla* | not scored | <1% |
| *Atriplex bunburyana* | not scored | 20% |
| *Atriplex codonocarpa* | not scored | <1% |
| *Boerhavia coccinea* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | 8-10% |
| *Dactyloctenium radulans* | not scored | <1% |
| *Dichanthium sericeum* subsp. *humilius* | not scored | <1% |
| *Enchylaena tomentosa* var. *tomentosa* | not scored | <1% |
| *Enneapogon polyphyllus* | not scored | <1% |
| *Enteropogon ramosus* | not scored | <1% |
| *Eragrostis dielsii* | not scored | 1% |
| *Eremophila forrestii* subsp. *forrestii* | not scored | <1% |
| *Eremophila latrobei* subsp. *filiformis* | not scored | <1% |
| *Eremophila youngii* subsp. *lepidota* | not scored | 2% |
| *Euphorbia biconvexa* | not scored | <1% |
| *Goodenia forrestii* | not scored | <1% |
| *Lepidium platypetalum* | not scored | 1-2% |
| Maireana platycarpa | not scored | 1% |
| *Maireana pyramidata* | not scored | 5-10% |
| Maireana triptera | not scored | <1% |
| *Paspalidium aff. jubiflorum* | not scored | <1% |
| *Pluchea dunlopii* | not scored | <1% |
| *Pluchea ferdinandi-muelleri* | not scored | <1% |
| *Portulaca intraterranea* | not scored | <1% |
| *Ptilotus nobilis* subsp. *nobilis* | not scored | <1% |
| *Ptilotus obovatus* | not scored | <1% |
| *Sarcostemma viminale* subsp. *australe* | not scored | <1% |
| *Sclerolaena cuneata* | not scored | <1% |
| *Sclerolaena densiflora* | not scored | <1% |
| *Sclerolaena diacantha* | not scored | 5-8% |
| *Senna artemisioides* subsp. *helmsii* | not scored | <1% |
| *Senna artemisioides* subsp. *oligophylla* | not scored | <1% |
| *Senna glutinosa* subsp. *glutinosa* | not scored | <1% |
| *Sida fibulifera* | not scored | 1% |
| *Sporobolus australasicus* | not scored | 1% |
| *Streptoglossa bubakii* | not scored | 1% |
| *Tecticornia indica* subsp. *bidens* | not scored | <1% |
| *Trianthema triquetrum* | not scored | <1% |
| *Triodia longiceps* | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT082

**Date established:** 30/07/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.46727437°S 119.7110719°E

**MGA** **Zone 50** 778987.3034 mE 7512927.153 mN

**Location:** On NE margin of Fortescue Marsh, 8.4 km NW of Moorimordinia Pool, 18.4 km WNW of 14 Mile Pool, 14.7 km SSE of Karntama Village (Christmas Creek Mine), 29.2 km WNW of Roy Hill summit, 36.2 km ENE of Marillana Homestead, 32.9 km NW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Mid-dense shrubland of *Muellerolimon salicorniaceum* over very sparse shrubs of *Tecticornia indica* subsp. *bidens*, over mid-dense grass and herb layerof *Mimulus* aff. *gracilis*, *Nicotiana heterantha*, *Eragrostis dielsii* and *Swainsona tanamiensis*.

**Site:** Margin of extensive saline flood plain and lake bed with deep (>0.5m), red-brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Alternanthera nodiflora* | not scored | <1% |
| *Angianthus cyathifer* | not scored | <1% |
| *Atriplex flabelliformis* | not scored | <1% |
| *Cressa australis* | not scored | 1% |
| *Eleocharis papillosa* | not scored | <1% |
| *Eragrostis dielsii* | not scored | 5-8% |
| *Heliotropium curassavicum* | not scored | 1% |
| *Marsilea drummondii* | not scored | <1% |
| *Mimulus* aff *gracilis* | not scored | 5-10% |
| *Muellerolimon salicorniaceum* | not scored | 45-50% |
| *Nicotiana heterantha* | not scored | 10-12% |
| *Swainsona tanamiensis* | not scored | 10-15% |
| *Tecticornia auriculata* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 2-5% |
| *Tecticornia indica* subsp. *leiostachya* | not scored | <1% |
| *Tecticornia pergranulata* subsp. *pergranulata* | not scored | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | <1% |
| *Triglochin hexagona* | not scored | <1% |
| *Trigonella suavissima* | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT083

**Date established:** 30/07/2014 **Date rescored:** not rescored

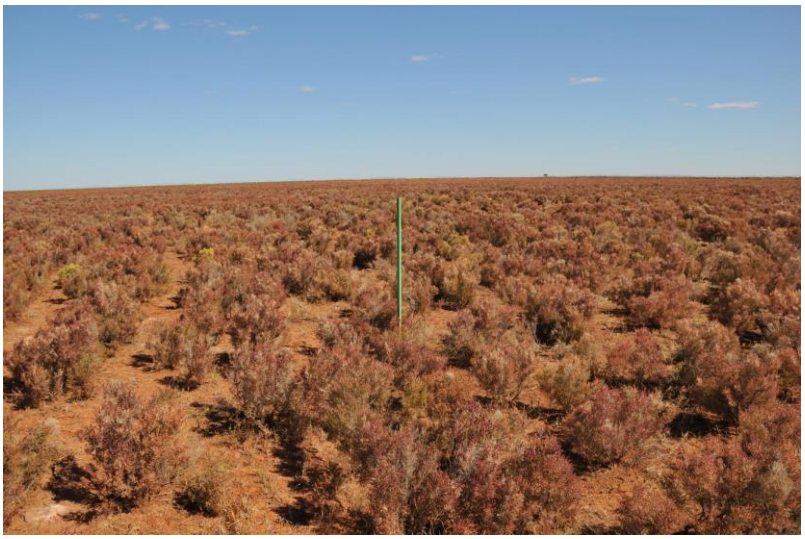
**Lat/Long (dd):** -22.46800938°S 119.7155627°E

**MGA** **Zone 50** 779448.2043 mE 7512837.354 mN

**Location:** On N margin of Fortescue Marsh, 8 km NW of Moorimordinia Pool, 14.9 km SSE of Karntama Village (Christmas Creek Mine), 28.7 km WNW of Roy Hill summit, 32.5 km NW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Mid-dense shrubland of *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) over mid-dense grassland and sedgeland of *Eragrostis dielsii* and *Cyperus bulbosus*.

**Site:** Stony flats on margin of extensive flood plain and freshwater channel with surface fragments of BIF & associated metasediments on shallow, pale orange-brown , silty loam soils.



| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cyperus bulbosus* | not scored | 5% |
| *Eragrostis dielsii* | not scored | 15 - (20)% |
| *Mimulus* aff *gracilis* | not scored | <1% |
| *Nicotiana heterantha* | not scored | <1% |
| *Swainsona tanamiensis* | not scored | <1% |
| *Tecticornia auriculata* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | 35-40% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT084

**Date established:** 30/07/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.46741577°S 119 .718494°E

**MGA** **Zone 50** 779751.2098 mE 7512897.64 mN

**Location:** On N margin of Fortescue Marsh, 7.8 km NW of Moorimordinia Pool, 17.7 km WNW of 14 Mile Pool, 14.9 km SSE of Karntama Village (Christmas Creek Mine), 36.9 km ENE of Marillana Homestead, 28.5 km WNW of Roy Hill summit, 32.4 km NW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Isolated plants of *Vachellia farnesiana* and *Acacia synchronicia*, over sparse shrubland of *Duma florulenta*, *Tecticornia indica* subsp. *bidens* and *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552), over dense grassland of *Sporobolus mitchellii*.

**Site:** Freshwater alluvial creekline draining off stony alluvial plains on margin of extensive saline flood plain and lake bed with deep (>0.5m), red-brown , silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Acacia synchronicia* | not scored | <1% |
| *Acacia tetragonophylla* | not scored | <1% |
| *Chloris pumilio* | not scored | <1% |
| *Cullen cinereum* | not scored | <1% |
| *Duma florulenta* | not scored | 2-5% |
| *Eragrostis dielsii* | not scored | 5% |
| *Eremophila spongiocarpa* | not scored | <1% |
| *Frankenia ambita* | not scored | 1% |
| Ipomoea muelleri | not scored | <1% |
| *Malvastrum americanum* | not scored | <1% |
| Marsilea sp. sterile | not scored | 5% |
| *Muellerolimon salicorniaceum* | not scored | <1% |
| *Nicotiana heterantha* | not scored | <1% |
| *Paspalidium aff. jubiflorum* | not scored | <1% |
| *Pluchea rubelliflora* | not scored | <1% |
| *Sesbania cannabina* | not scored | <1% |
| *Sporobolus mitchellii* | not scored | 75-80% |
| *Stemodia grossa* | not scored | <1% |
| *Swainsona kingii* | not scored | <1% |
| *Tecticornia auriculata* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 10-15% |
| *Tecticornia indica* subsp. *leiostachya* | not scored | 2-5% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | not scored | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | 2% |
| *Vachellia farnesiana* | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT085

**Date established:** 31/07/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.46808515°S 119.7223717°E

**MGA** **Zone 50** 780149.1194 mE 7512816.236 mN

**Location:** On N margin of Fortescue Marsh, 7.5 km NW of Moorimordinia Pool, 15.1 km SSE of Karntama Village (Christmas Creek Mine), 17.3 km WNW of 14 Mile Pool, 28.1 km WNW of Roy Hill summit, 37.2 km ENE of Marillana Homestead, 32 km NW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Mid-dense shrubland of *Tecticornia auriculata* over mid-dense shrubland of *Tecticornia indica* subsp. *leiostachya* and *Tecticornia indica* subsp. *bidens*, over very sparse grassland of *Eragrostis dielsii*.

**Site:** Extensive saline flood plain and lake bed with surface fragments of shells (Cochinella) on deep (>0.5m), red-brown , silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Alternanthera nodiflora* | not scored | <1% |
| *Chloris pectinata* | not scored | 1-2% |
| *Cyperus rigidellus* | not scored | <1% |
| *Dactyloctenium radulans* | not scored | <1% |
| *Echinochloa colona* | not scored | <1% |
| *Eragrostis dielsii* | not scored | 2-5% |
| *Eragrostis leptocarpa* | not scored | <1% |
| *Gomphrena affinis* subsp. *pilbarensis* | not scored | <1% |
| *Ipomoea coptica* | not scored | <1% |
| *Malvastrum americanum* | not scored | <1% |
| *Paspalidium aff. jubiflorum* | not scored | <1% |
| *Pluchea rubelliflora* | not scored | <1% |
| *Portulaca intraterranea* | not scored | <1% |
| *Portulaca oleracea* | not scored | <1% |
| *Tecticornia auriculata* | not scored | 45-50% |
| *Tecticornia indica* subsp. *bidens* | not scored | <1% |
| *Tecticornia indica* subsp. *leiostachya* | not scored | 30-40% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | <1% |
| *Trianthema triquetrum* | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT086

**Date established:** 31/07/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.46797568°S 119.7241371°E

**MGA** Zone 50 780331.1079 mE 7512825.058 mN

**Location:** On N margin of Fortescue Marsh, 7.4 km NW of Moorimordinia Pool, 15.2 km SSE of Karntama Village (Christmas Creek Mine), 17.2 km WNW of 14 Mile Pool 28 km WNW of Roy Hill summit, 37.3 km ENE of Marillana Homestead, 31.9 km NW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Isolated shrubs of *Acacia synchronicia* over mid-dense shrubland of *Eremophila spongiocarpa*, *Tecticornia indica* subsp *bidens*, *Paspalidium* aff jubiflorum, *Aristida latifolia*, Stemodia grosssa, *Tecticornia auriculata* and *Pluchea dunlopii*, over sparse grassland of *Eragrostis dielsii* and herbs of *Pluchea rubelliflora*.

**Site:** Stony flats on margin of extensive flood plain and lake bed with surface fragments of BIF on deep (>0.5m), red-brown , silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Acacia synchronicia* | not scored | <1% |
| *Alternanthera denticulata* | not scored | <1% |
| *Aristida latifolia* | not scored | 1% |
| *Bergia trimera* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | <1% |
| *Chloris pectinata* | not scored | <1% |
| *Cullen cinereum* | not scored | <1% |
| *Cyperus bulbosus* | not scored | <1% |
| *Cyperus vaginatus* | not scored | <1% |
| *Dactyloctenium radulans* | not scored | <1% |
| *Echinochloa colona* | not scored | <1% |
| *Enteropogon ramosus* | not scored | <1% |
| *Eragrostis cumingii* | not scored | <1% |
| *Eragrostis dielsii* | not scored | 10-15% |
| *Eragrostis leptocarpa* | not scored | <1% |
| *Eragrostis tenellula* | not scored | <1% |
| *Eremophila spongiocarpa* | not scored | <1% |
| Eriachne *flaccida* | not scored | <1% |
| *Eulalia aurea* | not scored | <1% |
| *Gomphrena affinis* subsp. *pilbarensis* | not scored | <1% |
| *Goodenia forrestii* | not scored | <1% |
| *Leptochloa fusca* subsp. *muelleri* | not scored | <1% |
| *Lotus cruentus* | not scored | <1% |
| *Maireana amoena* | not scored | <1% |
| *Malvastrum americanum* | not scored | <1% |
| Marsilea sp. sterile | not scored | <1% |
| *Muellerolimon salicorniaceum* | not scored | <1% |
| *Neptunia dimorphantha* | not scored | <1% |
| *Nicotiana heterantha* | not scored | <1% |
| *Panicum decompositum* | not scored | <1% |
| *Paspalidium aff. jubiflorum* | not scored | 5% |
| Pluchea *dentex* | not scored | <1% |
| *Pluchea dunlopii* | not scored | <1% |
| *Pluchea ferdinandi-muelleri* | not scored | <1% |
| *Pluchea rubelliflora* | not scored | 5-8% |
| *Pterocaulon sphacelatum* | not scored | <1% |
| *Ptilotus gomphrenoides* var. *gomphrenoides* | not scored | <1% |
| *Sida fibulifera* | not scored | <1% |
| *Stemodia grossa* | not scored | <1% |
| *Streptoglossa bubakii* | not scored | <1% |
| *Swainsona kingii* | not scored | <1% |
| *Swainsona tanamiensis* | not scored | <1% |
| *Tecticornia auriculata* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 40-50% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | not scored | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | <1% |
| *Vachellia farnesiana* | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT087

**Date established:** 1/08/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.46377945°S 119.7226061°E

**MGA** **Zone 50** 780181.9173 mE 7513292.789 mN

**Location:** On N margin of Fortescue Marsh, 7.8 km NW of Moorimordinia Pool, 17.6 km NW of 14 Mile Pool, 28.4 km WNW of Roy Hill summit, 37.4 km ENE of Marillana Homestead, 14.7 km SSE of Karntama Village, 32.3 km NW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Mid-dense shrubland of *Tecticornia indica* subsp. *bidens* and *Eremophila spongiocarpa* over sparse grasses of *Cenchrus ciliaris*, *Chloris pectinata* and *Eragrostis dielsii*.

**Site:** Stony flats on margin of extensive flood plain and lake bed with surface fragments of BIF & associated metasediments on shallow, red-brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Abutilon* oxycarpum subsp. Prostrate (A.A. Mitchell PRP 1266) | not scored | <1% |
| *Acacia synchronicia* | not scored | <1% |
| *Aristida contorta* | not scored | <1% |
| *Atriplex codonocarpa* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | 1% |
| Cenchrus setiger | not scored | <1% |
| *Chloris pectinata* | not scored | <1% |
| *Cleome viscosa* | not scored | <1% |
| *Dactyloctenium radulans* | not scored | <1% |
| *Dysphania rhadinostachya* subsp. inflata | not scored | <1% |
| *Einadia nutans* subsp. *eremaea* | not scored | <1% |
| *Enneapogon caerulescens* | not scored | <1% |
| *Enneapogon polyphyllus* | not scored | <1% |
| *Enteropogon ramosus* | not scored | <1% |
| *Eragrostis dielsii* | not scored | 5% |
| *Eragrostis xerophila* | not scored | <1% |
| *Eremophea spinosa* | not scored | <1% |
| *Eremophila spongiocarpa* | not scored | 2-3% |
| *Euphorbia boophthona* | not scored | <1% |
| *Euphorbia tannensis* subsp. *eremophila* | not scored | <1% |
| *Euphorbia vaccaria* var. *erucoides* | not scored | <1% |
| *Goodenia forrestii* | not scored | <1% |
| *Maireana amoena* | not scored | <1% |
| *Maireana carnosa* | not scored | <1% |
| *Maireana* integra | not scored | <1% |
| *Malvastrum americanum* | not scored | <1% |
| *Nicotiana heterantha* | not scored | <1% |
| *Paspalidium aff. jubiflorum* | not scored | <1% |
| *Portulaca filifolia* | not scored | <1% |
| *Portulaca intraterranea* | not scored | <1% |
| *Portulaca oleracea* | not scored | <1% |
| *Pterocaulon sphacelatum* | not scored | <1% |
| *Salsola australis* | not scored | <1% |
| Sauropus trachyspermus | not scored | <1% |
| *Sclerolaena* costata | not scored | <1% |
| *Sclerolaena cuneata* | not scored | <1% |
| *Senna* sp. Meekatharra (E. Bailey 1-26) | not scored | <1% |
| Setaria verticillata | not scored | <1% |
| *Sida fibulifera* | not scored | <1% |
| *Solanum lasiophyllum* | not scored | <1% |
| *Sporobolus australasicus* | not scored | <1% |
| *Streptoglossa bubakii* | not scored | <1% |
| *Streptoglossa odora* | not scored | <1% |
| *Swainsona kingii* | not scored | <1% |
| *Tecticornia auriculata* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 35-40% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | <1% |
| *Trianthema triquetrum* | not scored | <1% |
| Tribulus aff. eichlerianus | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT088

**Date established:** 1/08/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.46086372°S 119.7186781°E

**MGA** **Zone 50** 779783.3318 mE 7513623.14 mN

**Location:** On N margin of Fortescue Marsh, 8.4 km NW of Moorimordinia Pool, 14.2 km SSE of Karntama Village, 18.1 km NW of 14 Mile Pool, 28.9 km WNW of Roy Hill summit, 37.2 km ENE of Marillana Homestead, 48.8 km ESE of Minga Bore, 32.9 km NW of Roy Hill-Munjina and Marble intersection.

**Vegetation:** Isolated *Acacia* aneura over very sparse shrubs of *Acacia tetragonophylla* and *Eremophila youngii* subsp. *lepidota* over mid-dense shrubs of *Frankenia setosa*, *Sclerolaena cuneata*, *Eragrostis xerophila*, *Eragrostis setifolia*, *Cenchrus ciliaris* and *Trianthema turgidifolium*.

**Site:** Stony plains subject to sheet flow, near extensive saline flood plain with surface fragments of BIF, metasediments on shallow-deep, red-brown loamy sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Abutilon* cryptopetalum | not scored | <1% |
| *Acacia* aptaneura | not scored | <1% |
| *Acacia tetragonophylla* | not scored | <1% |
| *Aristida contorta* | not scored | <1% |
| *Atriplex codonocarpa* | not scored | <1% |
| *Boerhavia coccinea* | not scored | <1% |
| *Brachyachne prostrata* | not scored | <1% |
| *Calandrinia ptychosperma* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | 1% |
| *Cleome viscosa* | not scored | <1% |
| *Dactyloctenium radulans* | not scored | <1% |
| *Enchylaena tomentosa* var. *tomentosa* | not scored | <1% |
| *Enteropogon ramosus* | not scored | <1% |
| *Eragrostis dielsii* | not scored | <1% |
| *Eragrostis leptocarpa* | not scored | <1% |
| *Eragrostis* setifolia | not scored | <1% |
| *Eragrostis xerophila* | not scored | 2% |
| *Eremophila* cuneifolia | not scored | <1% |
| *Eremophila* forrestii subsp. forrestii | not scored | <1% |
| *Eremophila spongiocarpa* | not scored | <1% |
| *Eremophila youngii* subsp. *lepidota* | not scored | 2-5% |
| *Evolvulus alsinoides* var. *villosicalyx* | not scored | <1% |
| *Frankenia setosa* | not scored | 15% |
| Indigofera linnaei | not scored | <1% |
| *Maireana carnosa* | not scored | <1% |
| *Maireana eriosphaera* | not scored | <1% |
| *Maireana* integra | not scored | <1% |
| *Maireana pyramidata* | not scored | <1% |
| *Portulaca filifolia* | not scored | <1% |
| *Portulaca intraterranea* | not scored | <1% |
| *Portulaca oleracea* | not scored | <1% |
| *Ptilotus obovatus* | not scored | <1% |
| *Rhagodia eremaea* | not scored | <1% |
| *Salsola australis* | not scored | <1% |
| *Sclerolaena* aff. *densiflora* | not scored | <1% |
| *Sclerolaena cuneata* | not scored | 1% |
| *Sclerolaena* eriacantha | not scored | <1% |
| *Senna artemesioides helmsii* x *oligophylla* | not scored | <1% |
| *Senna artemisioides* subsp. *helmsii* | not scored | <1% |
| *Sida fibulifera* | not scored | <1% |
| *Solanum lasiophyllum* | not scored | <1% |
| *Streptoglossa bubakii* | not scored | <1% |
| *Streptoglossa odora* | not scored | <1% |
| *Trianthema triquetrum* | not scored | <1% |
| *Trianthema turgidifolium* | not scored | <1% |
| *Xerochloa barbata* | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT089

**Date established:** 1/08/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.46004514°S 119.7244114°E

**MGA** Zone 50 780375.3205 mE 7513703.102 mN

**Location:** On N margin of Fortescue Marsh, 8 km NW of Moorimordinia Pool, 14.4 km SSE of Karntama Village (Christmas Creek Mine), 17.7 km NW of 14 Mile Pool, 28.4 km WNW of Roy Hill summit.

**Vegetation:** Isolated trees of Eucalyptus victrix and *Acacia* coriacea subsp. pendans, over sparse shrubland of *Acacia synchronicia*, over mid-dense shrubland of *Atriplex bunburyana*, *Eremophila spongiocarpa* and *Tecticornia indica* subsp. *bidens*.

**Site:** Ephemeral creekline and alluvial fan on edge of saline flood plain with surface fragments of BIF & associated metasediments on deep (>0.5m), red-brown , sandy loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Acacia* coriacea subsp. pendens | not scored | <1% |
| *Acacia synchronicia* | not scored | 20% |
| *Acacia tetragonophylla* | not scored | <1% |
| *Aerva javanica* | not scored | <1% |
| *Aristida contorta* | not scored | <1% |
| *Atriplex bunburyana* | not scored | 15-20% |
| *Boerhavia coccinea* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | 8-10% |
| Cenchrus setiger | not scored | 5% |
| *Dactyloctenium radulans* | not scored | <1% |
| *Enchylaena tomentosa* var. *tomentosa* | not scored | <1% |
| *Enteropogon ramosus* | not scored | <1% |
| *Eragrostis dielsii* | not scored | <1% |
| *Eragrostis leptocarpa* | not scored | <1% |
| *Eragrostis xerophila* | not scored | <1% |
| *Eremophila* forrestii subsp. forrestii | not scored | <1% |
| *Eremophila spongiocarpa* | not scored | 1-2% |
| *Frankenia setosa* | not scored | <1% |
| *Maireana carnosa* | not scored | <1% |
| *Maireana* integra | not scored | <1% |
| *Maireana pyramidata* | not scored | <1% |
| *Malvastrum americanum* | not scored | <1% |
| *Panicum decompositum* | not scored | <1% |
| *Paspalidium aff. jubiflorum* | not scored | <1% |
| *Portulaca filifolia* | not scored | <1% |
| *Portulaca oleracea* | not scored | <1% |
| *Rhagodia eremaea* | not scored | <1% |
| *Sclerolaena* aff. *densiflora* | not scored | <1% |
| *Sclerolaena cuneata* | not scored | <1% |
| *Sclerolaena diacantha* | not scored | <1% |
| *Senna artemisioides* subsp. *oligophylla* | not scored | <1% |
| *Senna* sp. Meekatharra (E. Bailey 1-26) | not scored | <1% |
| *Sida fibulifera* | not scored | <1% |
| *Sporobolus australasicus* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 2-5% |
| *Trianthema triquetrum* | not scored | <1% |
| *Vachellia farnesiana* | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT090

**Date established:** 2/08/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.55591794°S 119.9099223°E

**MGA** **Zone 50** 799271.2982 mE 7502721.791 mN

**Location:** On far E edge of Fortescue Marsh, 4.8 km E of 14 Mile Pool, 6.9 km NW of Roy Hill summit, 8.7 km NW of Roy Hill Homestead, 14.7 km ESE of Moorimordinia Pool, 34.2 km SE of Karntama Village (Christmas Creek Mine), 13 km NNW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Sparse tree mallee and tall shrubs of *Eucalyptus victrix* and *Acacia coricea* subsp. *pendans* over mid-dense shrubland of *Melaleuca glomerata*, *Acacia coricea* subsp. *pendans*, *Acacia sclerosperma* subsp. *sclerosperma* and *Acacia tetragonophylla*, over mid-dense shrubland of *Acacia synchronicia*, *Duma florulenta* and *Eremophila spongiocarpa*, over sparse forbs and grasses of *Eragrostis dielsii*, *Cleome viscosa*, *Malvastrum americanum*, *Ptilotus gomphrenoides* var. *gomphrenoides* and *Dichanthium sericeum* subsp. *humilius.*

**Site:** Alluvial flats near ephernal and permanent freshwater river channels and margin of extensive flood plain with surface fragments of mixed - calcrete on deep (>0.5m), red-brown , silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Acacia coriacea* subsp. *pendens* | not scored | 2% |
| *Acacia sclerosperma* subsp. *sclerosperma* | not scored | 8% |
| *Acacia synchronicia* | not scored | 5-10% |
| *Acacia tetragonophylla* | not scored | 10-12% |
| *Aerva javanica* | not scored | <1% |
| *Alternanthera denticulata* | not scored | <1% |
| *Alysicarpus muelleri* | not scored | <1% |
| *Atalaya hemiglauca* | not scored | <1% |
| *Atriplex amnicola* | not scored | <1% |
| *Bergia perennis* subsp. *obtusifolia* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | <1% |
| *Chloris pectinata* | not scored | <1% |
| *Cleome viscosa* | not scored | 2% |
| *Convolvulus clementii* | not scored | <1% |
| *Corchorus tridens* | not scored | <1% |
| *Cucumis variabilis* | not scored | <1% |
| *Cullen cinereum* | not scored | <1% |
| *Dichanthium sericeum* subsp. *humilius* | not scored | <1% |
| *Duma florulenta* | not scored | 8-10% |
| *Enchylaena tomentosa* var. *tomentosa* | not scored | <1% |
| *Enneapogon caerulescens* | not scored | <1% |
| *Eragrostis dielsii* | not scored | 5% |
| *Eremophila spongiocarpa* | not scored | 5-10% |
| *Eremophila youngii* subsp. *lepidota* | not scored | <1% |
| *Eriochloa pseudoacrotricha* | not scored | <1% |
| Eucalyptus victrix | not scored | 10%-15% |
| *Euphorbia biconvexa* | not scored | <1% |
| *Euphorbia vaccaria* var. *erucoides* | not scored | <1% |
| *Evolvulus alsinoides* var. *villosicalyx* | not scored | <1% |
| *Goodenia pascua* | not scored | <1% |
| *Grevillea striata* | not scored | <1% |
| *Malvastrum americanum* | not scored | 5-10% |
| *Melaleuca glomerata* | not scored | 50-60% |
| *Melaleuca xerophila* | not scored | <1% |
| *Neptunia dimorphantha* | not scored | <1% |
| Panicum laevinode | not scored | <1% |
| *Paspalidium aff. jubiflorum* | not scored | <1% |
| *Portulaca filifolia* | not scored | <1% |
| *Portulaca oleracea* | not scored | <1% |
| *Pterocaulon sphacelatum* | not scored | <1% |
| *Ptilotus gomphrenoides* var. *gomphrenoides* | not scored | <1% |
| *Ptilotus macrocephalus* | not scored | <1% |
| *Ptilotus polystachyus* | not scored | <1% |
| *Rhynchosia australis* | not scored | <1% |
| *Rostellularia adscendens* var. *clementii* | not scored | <1% |
| *Scaevola spinescens* | not scored | <1% |

| | | |
|---|---|---|
| *Sclerolaena cornishiana* | not scored | <1% |
| *Sclerolaena densiflora* | not scored | <1% |
| *Senna* sp. Meekatharra (E. Bailey 1-26) | not scored | <1% |
| *Setaria dielsii* | not scored | <1% |
| *Setaria verticillata* | not scored | <1% |
| *Sida fibulifera* | not scored | <1% |
| *Sporobolus australasicus* | not scored | 1% |
| *Swainsona kingii* | not scored | <1% |
| *Teucrium racemosum* | not scored | <1% |
| *Trianthema* aff. *triquetrum* | not scored | <1% |
| *Urochloa occidentalis* var. *occidentalis* | not scored | <1% |
| *Vachellia farnesiana* | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT091

**Date established:** 2/08/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.55782725°S 119.9095258°E

**MGA** Zone 50 799226.3746 mE 7502511.044 mN

**Location:** On far E edge of Fortescue Marsh, 4.8 km E of 14 Mile Pool, 6.7 km NW of Roy Hill summit, 14.8 km ESE of Moorimordinia Pool, 34.3 km SE of Karntama Village (Christmas Creek Mine), 12.8 km NNW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Isolated trees of *Melaleuca glomerata* and *Acacia coriacea* subsp. *pendens* over very sparse shrubs of *Vachellia farnesiana*, over mid-dense shrubland of *Duma florulenta*, over sparse grasses and herbs of *Sporobolus mitchellii*, *Cullen cinereum*, *Neptunia dimorphantha* and *Streptoglossa adscendens*.

**Site:** Alluvial flats near freshwater river and margin of extensive flood plain with deep (>0.5m), red-brown, silty clay loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Acacia* coriacea subsp. pendens | not scored | <1% |
| *Atriplex amnicola* | not scored | 15% |
| *Bergia perennis* subsp. *obtusifolia* | not scored | <1% |
| *Chloris pectinata* | not scored | <1% |
| *Convolvulus clementii* | not scored | <1% |
| *Cressa australis* | not scored | <1% |
| *Cullen cinereum* | not scored | 10-15% |
| Cyperus bifax | not scored | <1% |
| *Cyperus bulbosus* | not scored | <1% |
| *Dichanthium sericeum* subsp. *humilius* | not scored | <1% |
| *Duma florulenta* | not scored | 50% |
| *Echinochloa colona* | not scored | <1% |
| *Eragrostis dielsii* | not scored | <1% |
| *Eriochloa pseudoacrotricha* | not scored | 1% |
| *Malvastrum americanum* | not scored | <1% |
| *Melaleuca glomerata* | not scored | <1% |
| *Neptunia dimorphantha* | not scored | <1% |
| *Nicotiana heterantha* | not scored | <1% |
| Panicum laevinode | not scored | <1% |
| *Pterocaulon sphacelatum* | not scored | <1% |
| *Ptilotus gomphrenoides* | not scored | <1% |
| *Scaevola spinescens* | not scored | <1% |
| *Sporobolus mitchellii* | not scored | 5% |
| *Streptoglossa adscendens* | not scored | 1% |
| *Tecticornia auriculata* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | <1% |
| *Tecticornia indica* subsp. *leiostachya* | not scored | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | <1% |
| Teucrium racemosum | not scored | <1% |
| Teucrium racemosum | not scored | <1% |
| *Vachellia farnesiana* | not scored | 8% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT092

**Date established:** 4/08/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.44140773°S 119.6449607°E

**MGA** **Zone 50** 772231.0869 mE 7515914.236 mN

**Location:** On central N margin of Fortescue Marsh, 11.6 km SSW of Karntama Village (Christmas Creek Mine), 15.6 km WNW of Moorimordinia Pool, 25.7 km WNW of 14 Mile Pool, 32.4 km NE of Marillana Homestead, 36.5 km WNW of Roy Hill summit, 40 km NW of Roy Hill-Munjina and and Marble Bar Rd intersection.

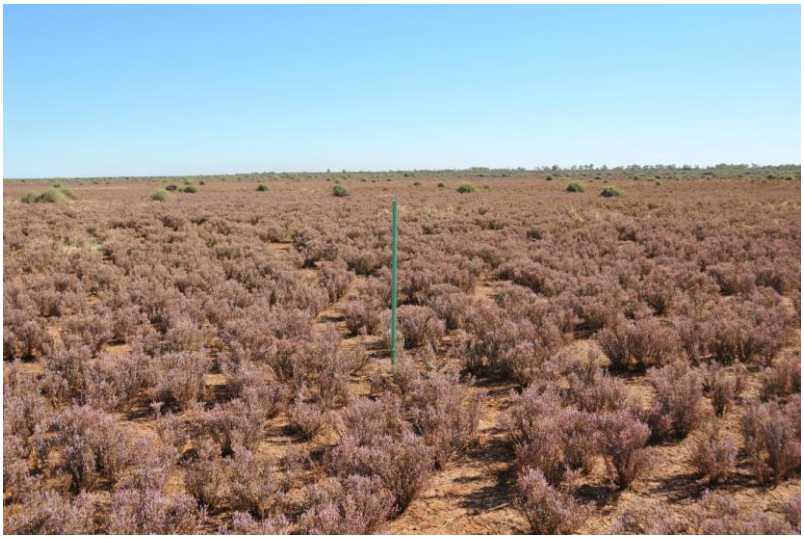
**Vegetation:** Mid-dense *Muellerolimon salicorniaceum* shrubland over sparse *Tecticornia indica* subsp. *bidens* shrubland, over dense lower stratum of *Mimulus* aff *gracilis*, *Atriplex flabelliformis*, *Nicotiana heterantha*, *Marsilea drummondii*, *Trigonella suavissima* and *Eleocharis papillosa*.

**Site:** Margin of extensive saline flood plain and lake bed with deep (>0.5m), red-brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| Aeschynomene *indica* | not scored | <1% |
| *Alternanthera nodiflora* | not scored | <1% |
| *Atriplex flabelliformis* | not scored | <1% |
| *Centipeda minima* subsp. *macrocephala* | not scored | <1% |
| *Cressa australis* | not scored | 1% |
| *Cullen cinereum* | not scored | <1% |
| *Eleocharis papillosa* | not scored | 8-10% |
| *Eragrostis dielsii* | not scored | <1% |
| *Heliotropium curassavicum* | not scored | <1% |
| *Marsilea drummondii* | not scored | 1-2% |
| *Mimulus* aff *gracilis* | not scored | 50-60% |
| *Muellerolimon salicorniaceum* | not scored | 25% |
| *Nicotiana heterantha* | not scored | 2% |
| *Peplidium* sp. E Evol. Fl. Fauna Arid Aust. (A.S. Weston 12768) | not scored | <1% |
| Schoenoplectus dissachanthus | not scored | <1% |
| *Swainsona tanamiensis* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 25% |
| *Trigonella suavissima* | not scored | 15% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT093



**Date established:** 3/08/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.50619297°S 119.7754816°E

**MGA** **Zone 50** 785539.1999 mE 7508494.111 mN

**Location:** On NE margin of Fortescue Marsh, 1.2 km NNE of Moorimordinia Pool, 10.5 km WNW of 14 Mile Pool, 21.3 km WNW of Roy Hill summit, 40.3 km ENE of Marillana Homestead, 21.3 km SSE of Karntama Village, 25.2 km NW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Isolated shrubs of *Muellerolimon salicorniaceum*, over mid-dense shrubland of *Tecticornia pergranulata* subsp. *pergranulata* and *Sporobolus mitchellii*, over sparse herbs of *Marsilea hirsuta Nicotiana heterantha*, *Cressa australis* and *Centipeda minima* subsp. *macrocephala*.

**Site:** Margin of extensive saline flood plain and lake bed with deep (>0.5m), red-brown, silty loam soils

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| Aeschynomene *indica* | not scored | <1% |
| *Alternanthera nodiflora* | not scored | <1% |
| *Bergia perennis* subsp. *obtusifolia* | not scored | <1% |
| *Centipeda minima* subsp. *macrocephala* | not scored | <1% |
| *Cressa australis* | not scored | <1% |
| *Cullen cinereum* | not scored | <1% |
| *Cyperus bulbosus* | not scored | <1% |
| *Eragrostis dielsii* | not scored | <1% |
| *Marsilea hirsuta* | not scored | 5% |
| *Muellerolimon salicorniaceum* | not scored | <1% |
| *Nicotiana heterantha* | not scored | <1% |
| *Sporobolus mitchellii* | not scored | 1-2% |
| *Streptoglossa adscendens* | not scored | <1% |
| *Swainsona tanamiensis* | not scored | <1% |
| *Tecticornia pergranulata* subsp. *pergranulata* | not scored | 35-40-50% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT094

**Date established:** 4/08/2014 **Date rescored:** not rescored

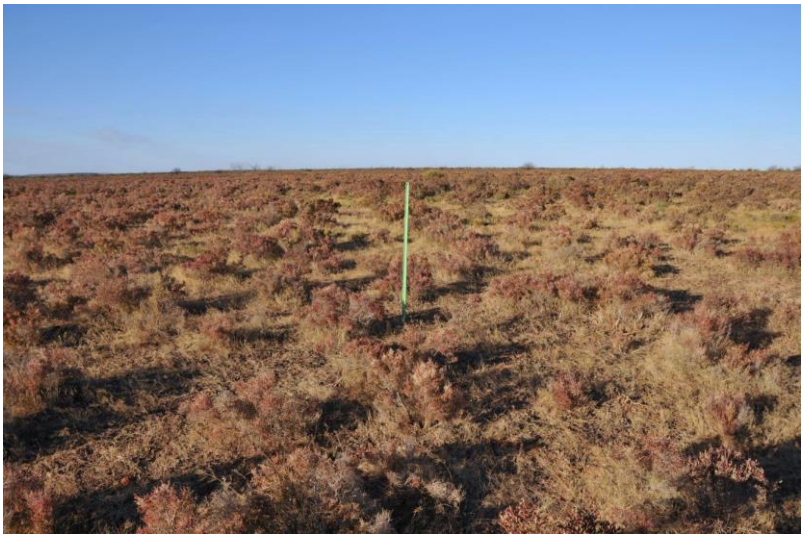
**Lat/Long (dd):** -22.43914059°S 119.6446539°E

**MGA** **Zone 50** 772203.9241 mE 7516165.938 mN

**Location:** On central_N margin of Fortescue Marsh, 11.4 km SSW of Karntama Village (Christmas Creek Mine), 15.8 km WNW of Moorimordinia Pool, 32.5 km NE of Marillana Homestead, 37.9 km WNW of Roy Hill Homestead, 40.2 km NW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Mid-dense shrubland of *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) and *Tecticornia indica* subsp. *bidens*, over mid-dense grasses and herbs of *Eragrostis dielsii*, *Nicotiana heterantha*, *Cyperus bulbosus*, *Dysphania plantaginella* and *Frankenia ambita*.

**Site:** Upper margin of extensive saline flood plain and lake bed, on bench of stony soils with surface fragments of BIF & associated metasediments on deep (>0.5m), pale red-brown to pale coffee-brown, loamy sand soils.



| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Angianthus cyathifer* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | <1% |
| *Cyperus bulbosus* | not scored | 1-2% |
| *Dysphania plantaginella* | not scored | 10% |
| *Eragrostis dielsii* | not scored | 35-40% |
| *Eremophila spongiocarpa* | not scored | <1% |
| *Frankenia ambita* | not scored | 1% |
| *Lawrencia densiflora* | not scored | <1% |
| *Maireana luehmannii* | not scored | <1% |
| *Muellerolimon salicorniaceum* | not scored | <1% |
| *Nicotiana heterantha* | not scored | 1% |
| Scaevola collaris | not scored | <1% |
| *Sporobolus mitchellii* | not scored | <1% |
| *Swainsona kingii* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 5% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | 30% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT095

**Date established:** 5/08/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.43218127°S 119.6459621°E

MGA Zone 50 772352.2338 mE 7516934.49 mN

**Location:** On central-N margin of Fortescue Marsh, 10.6 km SSW of Karntama Village (Christmas Creek Mine), 16.1 km NW of Moorimordinia Pool, 33.1 km NE of Marillana Homestead, 38.3 km WNW of Roy Hill Homestead, 40.5 km NW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Very sparse low trees and tall shrubs of senescent *Acacia* aptaneura, *Acacia tetragonophylla* and *Acacia* coriacea subsp. pendans, over mid-dense shrubland of *Eremophila* spongiocapra, *Tecticornia indica* subsp. *bidens*, *Scaevola spinescens*, over sparse lower stratum of *Sida fibulifera*, *Sporobolus mitchellii*, Setaria verticillata, *Abutilon* fraseri

**Site:** Stony alluvial flats on margin of extensive flood plain and freshwater channel with surface fragments of calcrete, BIF & associated metasediments on deep (>0.5m), red-brown to pale red-brown, loam-loam sand (boundary) soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Abutilon cryptopetalum* | not scored | <1% |
| *Abutilon fraseri* subsp. *fraseri* | not scored | <1% |
| *Abutilon lepidum* | not scored | <1% |
| *Abutilon macrum* | not scored | <1% |
| *Abutilon oxycarpum* subsp. Prostrate (A.A. Mitchell PRP 1266) | not scored | <1% |
| *Acacia aptaneura* | not scored | 2-5% alive |
| *Acacia coriacea* subsp. *pendens* | not scored | <1% |
| *Acacia tetragonophylla* | not scored | <1% |
| *Aristida contorta* | not scored | <1% |
| *Atriplex* cf. *bunburyana* | not scored | <1% |
| *Boerhavia* cf. *coccinea* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | 5-10% |
| *Chloris pumilio* | not scored | 5-8% |
| *Cleome viscosa* | not scored | <1% |
| *Convolvulus clementii* | not scored | <1% |
| *Dactyloctenium radulans* | not scored | <1% |
| *Dysphania melanocarpa* forma *leucocarpa* | not scored | <1% |
| *Echinochloa colona* | not scored | <1% |
| *Einadia nutans* subsp. *eremaea* | not scored | <1% |
| *Enchylaena tomentosa* var. *tomentosa* | not scored | <1% |
| *Enneapogon caerulescens* | not scored | <1% |
| *Enneapogon polyphyllus* | not scored | <1% |
| *Enteropogon ramosus* | not scored | <1% |
| *Eragrostis dielsii* | not scored | <1% |
| *Eragrostis* setifolia | not scored | <1% |
| *Eremophila spongiocarpa* | not scored | 15-20% |
| *Eremophila youngii* subsp. *lepidota* | not scored | <1% |
| Euphorbia cf. biconvexa | not scored | <1% |
| *Evolvulus alsinoides* var. *villosicalyx* | not scored | <1% |
| *Flaveria trinervia* | not scored | <1% |
| *Glycine canescens* | not scored | <1% |
| *Indigofera linnaei* | not scored | <1% |
| *Maireana amoena* | not scored | <1% |
| *Malvastrum americanum* | not scored | <1% |
| Melhania oblongifolia | not scored | <1% |
| *Neptunia dimorphantha* | not scored | <1% |
| *Nicotiana heterantha* | not scored | <1% |
| *Paspalidium* aff. *jubiflorum* | not scored | <1% |
| *Pluchea rubelliflora* | not scored | <1% |
| *Portulaca filifolia* | not scored | <1% |
| *Portulaca intraterranea* | not scored | <1% |
| *Pterocaulon sphacelatum* | not scored | <1% |
| *Ptilotus obovatus* | not scored | <1% |
| *Rhynchosia australis* | not scored | <1% |
| *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) | not scored | <1% |
| *Sauropus trachyspermus* | not scored | |
| *Scaevola spinescens* | not scored | <1% |
| *Sclerolaena diacantha* | not scored | <1% |
| *Senna artemesioides helmsii* x *oligophylla* | not scored | <1% |
| *Senna artemisioides* subsp. *oligophylla* | not scored | <1% |
| *Senna* sp. Meekatharra (E. Bailey 1-26) | not scored | <1% |

| | | |
|---|---|---|
| *Setaria verticillata* | not scored | 1% |
| *Sida fibulifera* | not scored | <1% |
| *Solanum lasiophyllum* | not scored | <1% |
| *Sporobolus australasicus* | not scored | <1% |
| *Sporobolus mitchellii* | not scored | 10-12% |
| *Streptoglossa decurrens* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 35% |
| *Tragus australianus* | not scored | |
| *Trianthema triquetrum* | not scored | <1% |
| *Tribulus* aff. *eichlerianus* | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT096

**Date established:** 5/08/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.44108059°S 119.6495146°E

**MGA** **Zone 50** 772700.6802mE 7515942.199 mN

**Location:** On central-N margin of Fortescue Marsh, 11.5 km SSW of Karntama Village (Christmas Creek Mine), 15.2 km WNW of Moorimordinia Pool, 32.7 km NE of Marillana Homestead, 41.3 km ESE of Minga Bore, 36.1 km WNW of Roy Hill summit, 39.6 km NW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Mid-dense shrubland of *Eremophila spongiocarpa* and *Tecticornia indica* subsp, *bidens*, over sparse grasses of *Eragrostis eriopoda*, *Eragrostis* per*gracilis* and *Sporobolus mitchellii*.

**Site:** Stony flats on margin of extensive flood plain and freshwater channel with surface fragments of BIF & associated metasediments on shallow-deep, red-brown, loamy sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Abutilon lepidum* | not scored | <1% |
| *Acacia synchronicia* | not scored | <1% |
| *Aerva javanica* | not scored | <1% |
| *Boerhavia coccinea* | not scored | <1% |
| *Bulbostylis barbata* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | <1% |
| *Chloris pectinata* | not scored | <1% |
| *Cleome viscosa* | not scored | <1% |
| *Convolvulus clementii* | not scored | <1% |
| *Dactyloctenium radulans* | not scored | <1% |
| *Dysphania plantaginella* | not scored | <1% |
| *Enneapogon caerulescens* | not scored | <1% |
| *Enteropogon ramosus* | not scored | <1% |
| *Eragrostis dielsii* | not scored | 20% |
| *Eragrostis eriopoda* | not scored | <1% |
| *Eragrostis* per*gracilis* | not scored | <1% |
| *Eremophila spongiocarpa* | not scored | 1-2% |
| Eriachne *obtusa* | not scored | <1% |
| *Goodenia forrestii* | not scored | <1% |
| *Indigofera colutea* | not scored | <1% |
| *Lawrencia densiflora* | not scored | <1% |
| *Maireana amoena* | not scored | <1% |
| *Maireana luehmannii* | not scored | <1% |
| *Mollugo cerviana* | not scored | <1% |
| *Nicotiana heterantha* | not scored | <1% |
| *Pluchea rubelliflora* | not scored | <1% |
| *Polycarpaea corymbosa* var. *corymbosa* | not scored | <1% |
| *Portulaca filifolia* | not scored | <1% |
| *Portulaca oleracea* | not scored | <1% |
| *Pterocaulon sphacelatum* | not scored | <1% |
| *Ptilotus helipteroides* | not scored | <1% |
| *Rhynchosia australis* | not scored | <1% |
| *Sida fibulifera* | not scored | <1% |
| *Solanum lasiophyllum* | not scored | <1% |
| *Sporobolus australasicus* | not scored | <1% |
| *Sporobolus mitchellii* | not scored | 1% |
| *Swainsona kingii* | not scored | <1% |
| Synaptantha tillaeacea var. tillaeacea | not scored | <1% |
| *Tecticornia auriculata* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 35-40% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | 1-2% |
| Tribulus aff. eichlerianus | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT097

**Date established:** 5/08/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.43699885°S 119.6438493°E

**MGA** **Zone 50** 772125.2516 mE 7516404.652 mN

**Location:** On central_N margin of Fortescue Marsh, 11.2 km SSW of Karntama Village (Christmas Creek Mine), 16 km WNW of Moorimordinia Pool, 32.6 km NE of Marillana Homestead, 38.1 km WNW of Roy Hill Homestead, 40.7 km ESE of Minga Bore, 36.8 km WNW of Roy Hill summit, 40.4 km NW of Roy Hill-Munjina and Marble Bar Rd intersection.

**Vegetation:** Very sparse shrubland of *Vachellia farnesiana*, *Acacia synchronicia* and *Acacia ampliceps*, over *Duma florulenta*, *Muellerolimon salicorniaceum* and *Tecticornia indica* subsp. *bidens*, over (mid)-dense grassland of *Sporobolus mitchellii* and *Eragrostis dielsii*.

**Site:** Freshwater alluvial creekline draining off stony alluvial plains on margin of extensive saline flood plain and lake bed with surface fragments of BIF & associated metasediments on deep (>0.5m), deep red-brown , silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Acacia ampliceps* | not scored | 1% |
| *Acacia synchronicia* | not scored | 1-2% |
| *Atriplex flabelliformis* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | <1% |
| *Cressa australis* | not scored | <1% |
| *Cucumis melo* | not scored | <1% |
| *Cullen cinereum* | not scored | <1% |
| *Duma florulenta* | not scored | 10-15% |
| *Dysphania plantaginella* | not scored | <1% |
| *Eragrostis dielsii* | not scored | 2-5% |
| *Eremophila spongiocarpa* | not scored | <1% |
| *Frankenia ambita* | not scored | <1% |
| Ipomoea muelleri | not scored | <1% |
| Ipomoea muelleri | not scored | <1% |
| *Maireana luehmannii* | not scored | <1% |
| *Malvastrum americanum* | not scored | <1% |
| Marsilea sp. sterile | not scored | <1% |
| *Muellerolimon salicorniaceum* | not scored | 5-8% |
| *Nicotiana heterantha* | not scored | <1% |
| *Pluchea rubelliflora* | not scored | <1% |
| *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) | not scored | <1% |
| *Solanum lasiophyllum* | not scored | <1% |
| *Sporobolus mitchellii* | not scored | 50-60% |
| *Swainsona kingii* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 15-20% |
| *Tecticornia indica* subsp. *leiostachya* | not scored | 1-2% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | not scored | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | <1% |
| *Vachellia farnesiana* | not scored | 5-8% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT098

**Date established:** 22/08/2014 **Date rescored:** not rescored

**Lat/Long (dd):**-22.43367735°S 119.4109652°E

MGA Zone 50 748150.3565 mE 7517176.554 mN

**Location:** Central part of Fortescue Marsh, 7.4 km NNW of Paroo Well, 19.1 km SE of Minga Bore, 14.5 km S of Cloudbreak Mine Village, 22.1 km N of Marillana Homestead.

**Vegetation:** *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552), *Tecticornia indica* subsp. *bidens*, Swainsona unifoliolata, and occasional Scaevola collaris, over sparse layer of *Eragrostis dielsii*, *Swainsona kingii*, *Dysphania plantaginella*and *Cyperus bulbosus*.

**Site:** Very slight surface exposure of calcrete outcrop and deposits in middle of extensive saline flood plain and lake bed, with surface fragments of calcrete & very fine BIF. Deep (>0.5m), pale red-brown, loamy sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Aerva javanica* | not scored | <1% |
| *Angianthus cyathifer* | not scored | <1% |
| *Angianthus cyathifer* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | <1% |
| *Cleome viscosa* | not scored | <1% |
| *Cyperus bulbosus* | not scored | 1-2% |
| *Dysphania plantaginella* | not scored | 1% |
| *Eragrostis* desertorum | not scored | <1% |
| *Eragrostis dielsii* | not scored | 5-8% |
| *Eremophila spongiocarpa* | not scored | <1% |
| *Gomphrena affinis* subsp. *pilbarensis* | not scored | <1% |
| *Muellerolimon salicorniaceum* | not scored | <1% |
| *Nicotiana heterantha* | not scored | <1% |
| *Pterocaulon sphacelatum* | not scored | <1% |
| *Ptilotus nobilis* subsp. *nobilis* | not scored | <1% |
| *Salsola australis* | not scored | <1% |
| Scaevola collaris | not scored | <1% |
| *Swainsona kingii* | not scored | 2-3% |
| Swainsona unifoliolata | not scored | <1% |
| *Tecticornia auriculata* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 5-8% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | 40% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT099

**Date established:** 24/08/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.45427605°S 119.4218319°E

**MGA** Zone 50 749232.4551mE 7514876.97 mN

**Location:** Central-south part of Fortescue Marsh, 19.9 km N of Marillana Homestead, 5 km N of Paroo Well, 16.6 km S of Cloudbreak Mine Village.

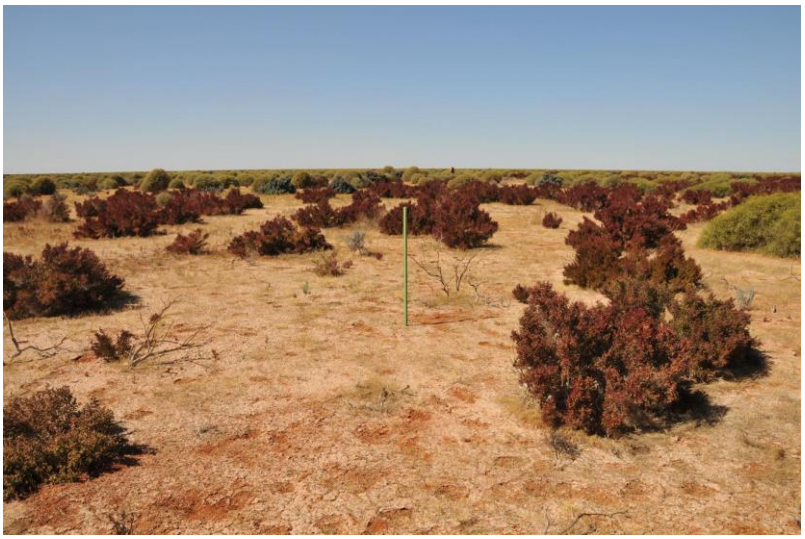
**Vegetation:** Isolated shrubs of *Melaleuca xerophila* over sparse shrubs of *Muellerolimon salicorniaceum*, over mid-dense shrubland of *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552), *Tecticornia indica* subsp. *bidens* and *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)& T. Colmer et al. KS 1063).

**Site:** Margin of extensive saline flood plain and lake bed adjacent to calcrete plain with surface fragments of calcrete on deep (>0.5m), pale red-brown, loamy sand soils

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cressa australis* | not scored | <1% |
| *Eragrostis dielsii* | not scored | <1% |
| *Flaveria trinervia* | not scored | <1% |
| *Frankenia ambita* | not scored | <1% |
| *Lawrencia densiflora* | not scored | <1% |
| *Melaleuca xerophila* | not scored | <1% |
| *Muellerolimon salicorniaceum* | not scored | 25-30% |
| *Nicotiana heterantha* | not scored | <1% |
| *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) | not scored | <1% |
| *Streptoglossa bubakii* | not scored | <1% |
| *Streptoglossa odora* | not scored | <1% |
| *Swainsona kingii* | not scored | 1% |
| *Tecticornia auriculata* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 2-5% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | not scored | 10-12% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | 25-30% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT100



**Date established:** 25/08/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.4136923°S 119.4227748°E

**MGA** **Zone 50** 749402.1106mE 7519370.561 mN

**Location:** Central part of Fortescue Marsh, 9.5 km N of Paroo Well, 18.8 km ESE of Minga Bore, 12.1 km S of Cloudbreak Mine Village, 24.4 km N of Marillana Homestead.

**Vegetation:** Very sparse tall shrubs of *Muellerolimon salicorniaceum* shrubs over sparse shrubland of *Muellerolimon salicorniaceum*, *Tecticornia* globlifera, *Tecticornia auriculata* and *Tecticornia indica* subsp. *bidens*, over sparse ground layer of *Cressa australis*, *Eragrostis dielsii*, *Mimulus* aff. *gracilis* and *Cyperus bulbosus*.

**Site:** Extensive saline flood plain and lake bed with surface fragments of occasional shells on deep (>0.5m), red-brown, silty loam soils

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cressa australis* | not scored | 5-8% |
| *Cyperus bulbosus* | not scored | <1% |
| *Eragrostis dielsii* | not scored | 2% |
| *Frankenia ambita* | not scored | <1% |
| *Heliotropium curassavicum* | not scored | <1% |
| *Maireana luehmannii* | not scored | <1% |
| *Mimulus* aff *gracilis* | not scored | 40-50% |
| *Muellerolimon salicorniaceum* | not scored | 10-15% |
| *Tecticornia auriculata* | not scored | 1-2% |
| *Tecticornia globulifera* | not scored | 8-10% |
| *Tecticornia indica* subsp. *bidens* | not scored | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT101

**Date established:** 25/08/2014 **Date rescored:** not rescored

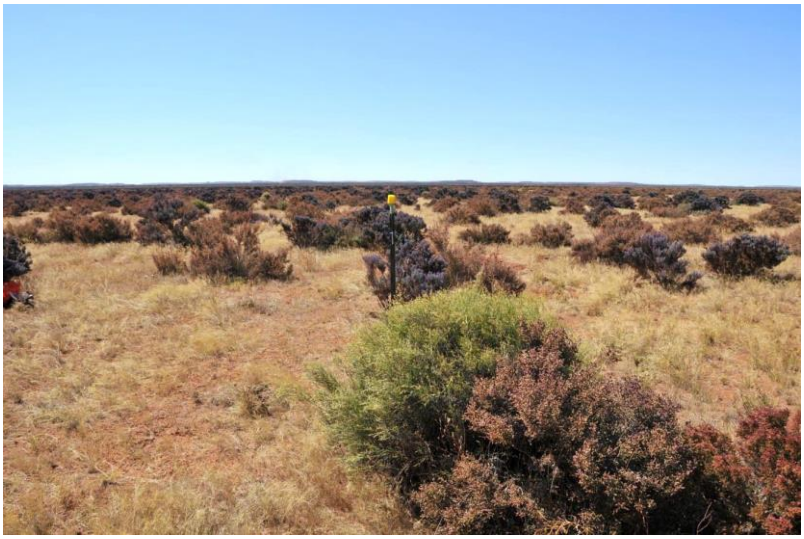
**Lat/Long (dd):** -22.40522523°S 119.4190221°E

**MGA** **Zone 50** 749030.7486 mE 7520314.62 mN

**Location:** Central part of Fortescue Marsh, 43.1 km E of Cowra Line Camp, 10.4 km N of Paroo Well, 18 km ESE of Minga Bore, 11.2 km S of Cloudbreak Mine Village, 25.3 km N of Marillana Homestead.

**Vegetation:** Mid-dense shrubland of *Tecticornia indica* subsp. *bidens* and *Tecticornia auriculata* over mid-dense grassland of *Eragrostis dielsii* and very sparse herbs of *Swainsona kingii*, Nicotiana heteranthera and isolated shrubs of *Frankenia ambita*.

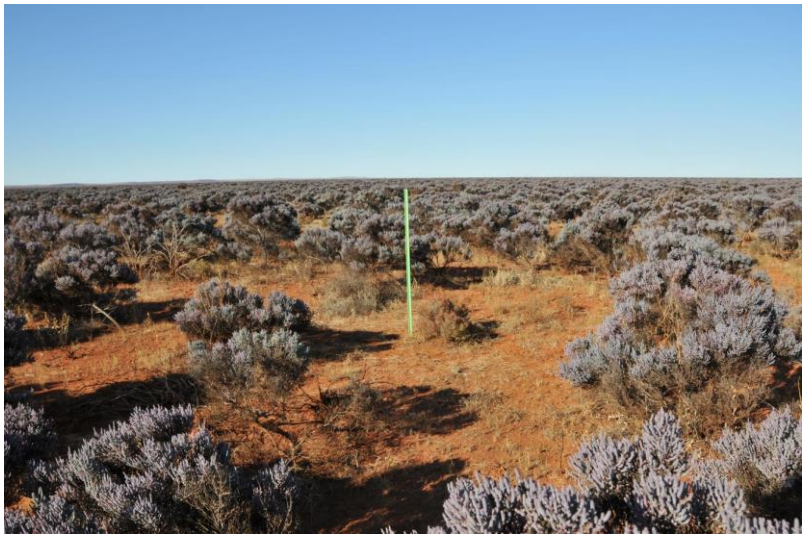
**Site:** Extensive saline flood plain and lake bed with surface fragments of shells on deep (>0.5m), red-brown, silty loam soils.



| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Atriplex flabelliformis* | not scored | <1% |
| *Chloris pumilio* | not scored | <1% |
| *Cleome viscosa* | not scored | <1% |
| *Cyperus bulbosus* | not scored | <1% |
| *Enteropogon ramosus* | not scored | dubious |
| *Eragrostis dielsii* | not scored | 60% |
| *Frankenia ambita* | not scored | <1% |
| *Maireana luehmannii* | not scored | <1% |
| *Muellerolimon salicorniaceum* | not scored | <1% |
| *Nicotiana heterantha* | not scored | 1% |
| *Ptilotus nobilis* subsp. *nobilis* | not scored | <1% |
| *Streptoglossa odora* | not scored | <1% |
| *Swainsona kingii* | not scored | 1% |
| *Tecticornia auriculata* | not scored | 5-10% |
| *Tecticornia indica* subsp. *bidens* | not scored | 25% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT102



**Date established:** 25/08/2014 **Date rescored:** not rescored

**Lat/Long (dd):**-22.43393174°S 119.4021191°E

**MGA** **Zone 50** 7517162.986 mN 747239.0334 mE

**Location:** Central part of Fortescue Marsh, 7.6 km NNW of Paroo Well, 18.5 km SE of Minga Bore, 41.8 km E of Cowra Line Camp, 14.6 SSW of Cloudbreak Mine Village, 22.1 km N of Marillana Homestead.

**Vegetation:** Mid-dense shrubland of *Tecticornia auriculata* (with occasional shrubs of *Tecticornia indica* subsp. *bidens* and *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552), over sparse lower stratum of *Cyperus bulbosus*, *Eragrostis dielsii*, *Swainsona kingii* and *Swainsona tanamiensis*.

**Site:** Extensive saline flood plain and lake bed with deep (>0.5m), red-brown, silty loam soils

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cyperus bulbosus* | not scored | 10-15% |
| *Enneapogon polyphyllus* | not scored | <1% |
| *Eragrostis dielsii* | not scored | 8-10% |
| *Flaveria trinervia* | not scored | <1% |
| *Nicotiana heterantha* | not scored | <1% |
| *Ptilotus nobilis* subsp. *nobilis* | not scored | <1% |
| *Swainsona kingii* | not scored | I-1% |
| *Swainsona tanamiensis* | not scored | I-1% |
| *Tecticornia auriculata* | not scored | 45% |
| *Tecticornia globulifera* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT103

**Date established:** 27/08/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.44312577°S 119.338852°E

**MGA** **Zone 50** 740708.7502 mE 7516247.589 mN

**Location:** Central-southern part of Fortescue Marsh, 10.8 km NW of Paroo Well, 15.2 km SSE of Minga Bore, 18.1 km SSW of Cloudbreak Mine Village, 22.2 km NNW of Marillana Homestead,35.7 km ESE of Cowra Line Camp.

**Vegetation:** Sparse shrubland of *Eremophila spongiocarpa*, *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552), *Tecticornia indica* subsp. *bidens* and *Tecticornia indica* subsp. *leiostachya*, and isolated patches of *Panicum decompositum*, over dense ground layer of *Cullen cinereum* and *Eragrostis dielsii*.

**Site:** Freshwater drainage (derived from calcrete plains) on margin of extensive saline flood plain and lake bed with deep (>0.5m), red-brown, loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Alternanthera nodiflora* | not scored | <1% |
| *Atriplex amnicola* | not scored | <1% |
| *Cullen cinereum* | not scored | 40-50% |
| *Eragrostis dielsii* | not scored | 15% |
| *Eremophila spongiocarpa* | not scored | 15% |
| *Maireana luehmannii* | not scored | <1% |
| *Muellerolimon salicorniaceum* | not scored | <1% |
| *Neptunia dimorphantha* | not scored | <1% |
| *Panicum decompositum* | not scored | <1% |
| *Streptoglossa adscendens* | not scored | 1% |
| *Streptoglossa liatroides* | not scored | <1% |
| *Swainsona kingii* | not scored | <1% |
| *Tecticornia auriculata* | not scored | <1% |
| *Tecticornia globulifera* | not scored | 1-2% |
| *Tecticornia indica* subsp. *bidens* | not scored | 5-8% |
| *Tecticornia indica* subsp. *leiostachya* | not scored | 1-2% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | 5% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT104

**Date established:** 27/08/2014 **Date rescored:** not rescored

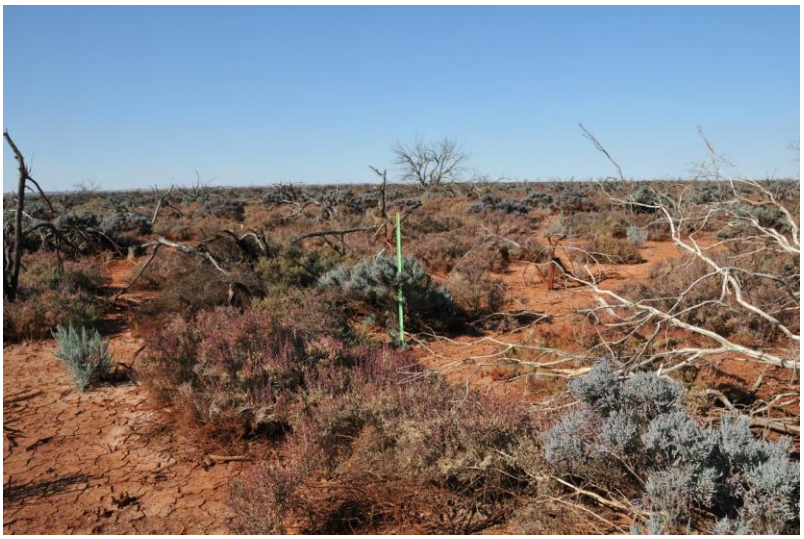
**Lat/Long (dd):** -22.43542875°S 119.3386382°E

**MGA** **Zone 50** 740700.0336 mE 7517100.437 mN

**Location:** Central-southern part of Fortescue Marsh, 11.4 km NW of Paroo Well, 14.4 km SSE of Minga Bore, 17.4 km SSW of Cloudbreak Mine Village, 35.5 km ESE of Cowra Line Camp, 23 km NNW of Marillana Homestead.

**Vegetation:** Senesced sparse *Acacia* sp. and *Melaleuca* sp. over mid-dense *Tecticornia auriculata*, *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)& T. Colmer et al. KS 1063) and *Tecticornia indica* subsp. *bidens*, over sparse ground stratum of Marsilea sp., *Nicotiana heterantha*, *Eragrostis dielsii* and *Tecticornia indica* subsp. *bidens* seedlings.

**Site:** Extensive saline flood plain and lake bed with deep (>0.5m), red-brown, silty loam soils.



| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Alternanthera nodiflora* | not scored | <1% |
| *Atriplex flabelliformis* | not scored | <1% |
| *Cullen cinereum* | not scored | <1% |
| *Eragrostis dielsii* | not scored | <1% |
| *Heliotropium curassavicum* | not scored | <1% |
| *Lawrencia* glomerata | not scored | <1% |
| *Maireana luehmannii* | not scored | <1% |
| *Marsilea hirsuta* | not scored | <1% |
| *Muellerolimon salicorniaceum* | not scored | <1% |
| *Nicotiana heterantha* | not scored | <1% |
| *Pluchea rubelliflora* | not scored | <1% |
| *Ptilotus nobilis* subsp. *nobilis* | not scored | <1% |
| *Streptoglossa bubakii* | not scored | <1% |
| *Streptoglossa liatroides* | not scored | <1% |
| *Swainsona tanamiensis* | not scored | <1% |
| *Tecticornia auriculata* | not scored | 10-12% |
| *Tecticornia indica* subsp. *bidens* | not scored | 15-20% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | not scored | 20% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT105

**Date established:** 28/08/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.45823356°S 119.3376535°E

**MGA** **Zone 50** 740559.2741 mE 7514576.206 mN

**Location:** Central-southern margin of Fortescue Marsh, 10.1 km WNW of Paroo Well, 16.6 km SSE of Minga Bore and 19.6 km SSW of Cloudbreak Mine Village, 36 km ESE of Cowra Line Camp, 20.7 km NNW of Marillana Homestead.

**Vegetation:** Mid-dense shrubland of *Tecticornia indica* subsp. *bidens*, *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) and occasional *Eremophila spongiocarpa*, over sparse ground stratum of *Eragrostis dielsii*, *Maireana* luehmani, *Swainsona kingii* and *Cullen cinereum*

**Site:** Loamy sandy flats adjacent to sand dune deposits near margin of extensive saline flood plain and lake bed with surface fragments of occasional BIF on deep (>0.5m), red-brown with paler crust, loamy sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cenchrus ciliaris* | not scored | <1% |
| *Cleome viscosa* | not scored | <1% |
| *Cullen cinereum* | not scored | <1% |
| *Dactyloctenium radulans* | not scored | <1% |
| *Eragrostis dielsii* | not scored | 15% |
| *Eremophila spongiocarpa* | not scored | <1% |
| *Frankenia ambita* | not scored | <1% |
| *Gomphrena affinis* subsp. *pilbarensis* | not scored | <1% |
| *Maireana luehmannii* | not scored | <1% |
| *Nicotiana heterantha* | not scored | <1% |
| *Swainsona kingii* | not scored | <1% |
| *Tecticornia auriculata* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 40-45% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | 2% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT106

**Date established:** 28/08/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.45961515°S 119.3316375°E

**MGA** Zone 50 739937.5628 mE 7514432.831 mN

**Location:** Central-southern margin of Fortescue Marsh, 10.6 km WNW of Paroo Well, 16.5 km SSE of Minga Bore, 20 km SSW of Cloudbreak Mine Village, 20.8 km NNW of Marillana Homestead.

**Vegetation:** Sparse tall shrubs of *Acacia synchronicia* over sparse shrubland of *Eremophila spongiocarpa*, *Stemodia grossa*, *Vachellia farnesiana*, *Acacia synchronicia*, *Tecticornia indica* subps *bidens* and *Solanum morrisonii*, over dense ground herbfield and grasses of *Cullen cinereum*, *Eragrostis dielsii*, *Panicum decompositum* and *Aristida latifolia*

**Site:** Freshwater alluvial creekline draining off calcrete plains on margin of extensive saline flood plain and lake bed with surface fragments of calcrete and BIF on deep (>0.5m), red-brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Acacia synchronicia* | not scored | 15-20% |
| *Aristida latifolia* | not scored | 1% |
| *Atriplex bunburyana* | not scored | <1% |
| *Atriplex bunburyana* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | <1% |
| *Cucumis melo* | not scored | <1% |
| *Cullen cinereum* | not scored | 8-10% |
| *Dactyloctenium radulans* | not scored | <1% |
| *Einadia nutans* subsp. *eremaea* | not scored | <1% |
| *Enchylaena tomentosa* var. *tomentosa* | not scored | <1% |
| *Enteropogon ramosus* | not scored | <1% |
| *Eragrostis dielsii* | not scored | 70-75% |
| *Eragrostis xerophila* | not scored | <1% |
| *Eremophila longifolia* | not scored | <1% |
| *Eremophila spongiocarpa* | not scored | 8-10% |
| *Gomphrena affinis* subsp. *pilbarensis* | not scored | <1% |
| *Marsilea hirsuta* | not scored | <1% |
| *Neptunia dimorphantha* | not scored | <1% |
| *Nicotiana heterantha* | not scored | <1% |
| *Panicum decompositum* | not scored | 1-2% |
| *Paspalidium aff. jubiflorum* | not scored | <1% |
| *Pluchea dunlopii* | not scored | <1% |
| *Pluchea ferdinandi-muelleri* | not scored | <1% |
| *Pterocaulon sphacelatum* | not scored | <1% |
| *Ptilotus gomphrenoides* var. gomphrenoides | not scored | <1% |
| *Rhynchosia australis* | not scored | <1% |
| *Sclerolaena diacantha* | not scored | <1% |
| *Sida fibulifera* | not scored | <1% |
| *Solanum lasiophyllum* | not scored | <1% |
| *Solanum morrisonii* | not scored | <1% |
| *Stemodia grossa* | not scored | <1% |
| Stemodia viscosa | not scored | <1% |
| *Streptoglossa bubakii* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 1% |
| *Tecticornia indica* subsp. *leiostachya* | not scored | <1% |
| *Vachellia farnesiana* | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT107

**Date established:** 29/08/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.43463348°S 119.4192948°E

**MGA** **Zone 50** 749006.3509 mE 7517056.847 mN

**Location:** Central part of Fortescue Marsh, 7.2 km N of Paroo Well, 19.9 km SE of Minga Bore, 14.5 km S of Cloudbreak Mine Village, 22 km N of Marillana Homestead.

**Vegetation:** Mid-dense Muellerolimon salicorniceum and *Tecticornia auriculata* shrubland over mid-dense *Mimulus* aff *gracilis* herbfield.

**Site:** Extensive saline flood plain and lake bed with deep (>0.5m), red-brown- surface of white soft crust, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Mimulus* aff *gracilis* | not scored | 50% |
| *Muellerolimon salicorniaceum* | not scored | 8-10% |
| *Tecticornia auriculata* | not scored | 40% |
| *Tecticornia globulifera* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT108

**Date established:** 29/08/2014 **Date rescored:** not rescored

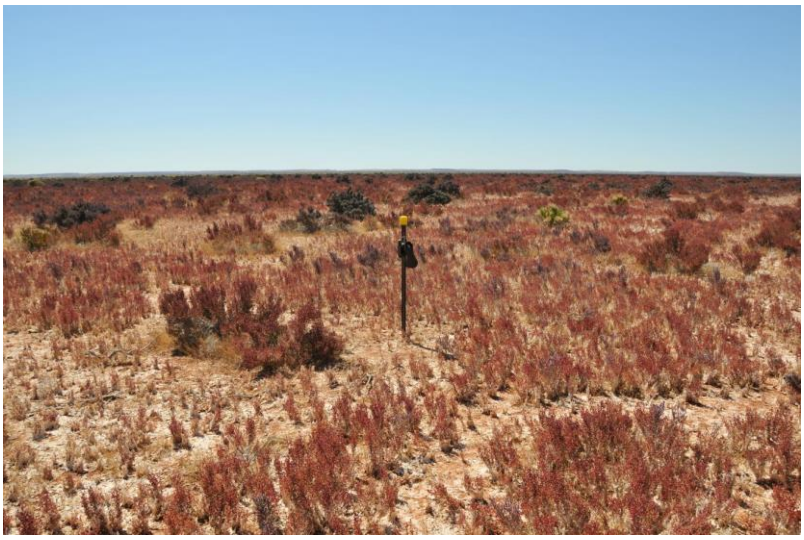
**Lat/Long (dd):** -22.43585061°S 119.424092°E

**MGA** **Zone 50** 749498.1284 mE 7516914.061 mN

**Location:** Central part of Fortescue Marsh, 7 km N of Paroo Well, 20.3 km SE of Minga Bore, 21.9 km N of Marillana Homestead, 14.6 km S of Cloudbreak Mine Village.

**Vegetation:** Sparse shrubland of *Tecticornia auriculata*, *Tecticornia globulifera* and (occasional) *Tecticornia medusa* over mid-dense *Tecticornia globulifera* seedlings and *Mimulus* aff. *gracilis* herbfield.

**Site:** Extensive saline flood plain and lake bed with deep (>0.5m), red-brown & pale surface crust, silty loam soils.



| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Maireana luehmannii* | not scored | <1% |
| *Mimulus* aff *gracilis* | not scored | 15% |
| *Muellerolimon salicorniaceum* | not scored | <1% |
| *Tecticornia auriculata* | not scored | 8-10% |
| *Tecticornia globulifera* | not scored | 50% |
| *Tecticornia indica* subsp. *bidens* | not scored | <1% |
| *Tecticornia medusa* | not scored | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT109

**Date established:** 30/08/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.46264546°S 119.443870084°E

**MGA** **Zone 50** 726733.8815 mE 7518466.236 mN

**Location:** Central-west part of Fortescue Marsh, 31.3 km NW of Marillana Homestead, 21.7 km ESE of Cowra Line Camp, 13.2 km SSW of Minga Bore, 27.1 km WSW of Cloudbreak Mine Village.

**Vegetation:** Very sparse shrubland of *Acacia sclerosperma* over very sparse shrubs of *Maireana* pyrimidata, *Senna artemisioides* subsp. *helmsii*, *Aerva javanica* and *Rhagodia eremaea*, over mid-dense low shrubs and grasses of *Scaevola collaris*, *Eragrostis dielsii*, *Cenchrus ciliaris* and *Neobassia astrocarpa*.

**Site:** Crest of low (3 - 5 m), gently sloping - flat gypsum outcrop on extensive saline flood plain and lake bed. Westly aspect, with surface fragments of calcrete and gypsum on very rocky gypsum outcrop with skeletal, white- pale orange-brown, loamy sand soils

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Acacia sclerosperma* subsp. *sclerosperma* | not scored | 5% |
| *Aerva javanica* | not scored | <1% |
| *Boerhavia coccinea* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | 5% |
| *Enneapogon caerulescens* | not scored | <1% |
| *Eragrostis dielsii* | not scored | 15% |
| *Maireana pyramidata* | not scored | <1% |
| *Neobassia astrocarpa* | not scored | 5% |
| *Rhagodia eremaea* | not scored | <1% |
| *Salsola australis* | not scored | <1% |
| *Scaevola collaris* | not scored | 25-30% |
| *Senna artemisioides* subsp. *helmsii* | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT110

**Date established:** 4/09/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.4250072°S 119.2028279°E

MGA Zone 50 751486.2843 mE 7513913.12 mN

**Location:** Central-southern margin of Fortescue Marsh, 19.3 km N of Marillana Homestead, 4.5 km NNE of Paroo Well, 37.2 km E of Mingah Well, 17.5 km S of Cloudbreak Mine Village, 78.1 km E of Auski Roadhouse and 103.3 km NNW of Newman, Pilbara IBRA

**Vegetation:** Sparse tall shrubland of *Melaleuca glomerata* and *Melaleuca xerophila* over sparse shrubland of *Tecticornia indica* subsp. *bidens*, *Eremophila spongiocarpa* and occasional *Triodia epactia*, over sparse grassland and subshrubs of *Eragrostis dielsii* and *Eremophea spinosa*.

**Site:** Margin of calcrete plain and on margin of extensive saline flood plain and lake bed with surface fragments of calcrete. Very slightly rocky, flat calcrete outcropping, with skeletal, pale coffee orange-brown, loamy sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cenchrus ciliaris* | not scored | <1% |
| *Einadia nutans* subsp. *eremaea* | not scored | <1% |
| *Enchylaena tomentosa* var. *tomentosa* | not scored | <1% |
| *Eragrostis dielsii* | not scored | 15% |
| *Eremophea spinosa* | not scored | 1-2% |
| *Eremophila spongiocarpa* | not scored | 15-20% |
| *Goodenia forrestii* | not scored | <1% |
| Heliotropium chrysocarpum | not scored | <1% |
| *Lawrencia densiflora* | not scored | <1% |
| *Maireana luehmannii* | not scored | <1% |
| *Maireana tomentosa* subsp. *tomentosa* | not scored | <1% |
| *Melaleuca glomerata* | not scored | 10-15% |
| *Melaleuca xerophila* | not scored | 2% |
| *Muellerolimon salicorniaceum* | not scored | <1% |
| *Pluchea ferdinandi-muelleri* | not scored | <1% |
| *Ptilotus nobilis* subsp. *nobilis* | not scored | <1% |
| *Ptilotus obovatus* | not scored | <1% |
| *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) | not scored | <1% |
| *Scaevola spinescens* | not scored | <1% |
| *Senna* glutinosa subsp. x luerssenii | not scored | <1% |
| *Sida fibulifera* | not scored | <1% |
| *Solanum lasiophyllum* | not scored | <1% |
| *Streptoglossa odora* | not scored | <1% |
| *Swainsona kingii* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 10-12% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | not scored | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | <1% |
| *Triodia epactia* | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT111

**Date established:** 4/09/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.42543878°S 119.2022513°E

**MGA** **Zone 50** 726673.8117 mE 7518419.309 mN

**Location:** Central-west part of Fortescue Marsh, 12.4 km E of Mingah Well, 31.3 km NW of Marillana Homestead, 21.6 km ESE of Cowra Line Camp, 24.3 km WNW of Paroo Well, 27.2 km WSW of Cloudbreak Mine Village.

**Vegetation:** Isolated plants of *Lawrencia helmsii* over sparse shrubland of *Scaevola collaris*, *Neobassia astrocarpa* and *Frankenia ambita*.

**Site:** Flats at western base of low (3-5 m), gypsum outcrop on extensive saline flood plain and lake bed with surface fragments of calcrete on skeletal, pale orange-brown , sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Aerva javanica* | not scored | <1% |
| *Boerhavia* cf. *coccinea* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | <1% |
| *Eragrostis dielsii* | not scored | <1% |
| *Euphorbia tannensis* subsp. *eremophila* | not scored | <1% |
| *Frankenia ambita* | not scored | 5-8% |
| *Lawrencia helmsii* | not scored | <1% |
| *Maireana luehmannii* | not scored | <1% |
| *Neobassia astrocarpa* | not scored | 5-8% |
| *Salsola australis* | not scored | <1% |
| *Scaevola collaris* | not scored | 2-5% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | <1% |
| *Zygophyllum compressum* | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT112

**Date established:** 5/09/2014 **Date rescored:** not rescored

**Lat/Long (dd):**-22.42375016°S 119.2400867°E

**MGA** **Zone 50** 730572.3383 mE 7518548.684 mN

**Location:** Central-west part of Fortescue Marsh, 16.3 km E of Mingah Well, 28.9 km NW of Marillana Homestead, 25.3 km ESE of Cowra Line Camp, 22.1 km SE of Kardardarrie Well, 20.8 km WNW of Paroo Well, 23.7 km SW of Cloudbreak Mine Village.

**Vegetation:** Emergent isolated tall shrubs of *Acacia sclerosperma* and Santalum lanceolatum over very sparse shrubland of *Maireana* pyrimidata, *Senna* sp. Meekatharra (E. Bailey 1-26), *Senna artemisioides* subsp. *helmsii*, *Rhagodia eremaea* and *Acacia sclerosperma*, over sparse subshrub and grass stratum of Scaevola collaris, Enneapogon

**Site:** Crest of low (5 m) gypsum outcrop on extensive saline flood plain and lake bed. Some cover of lichen soil crust with surface fragments of calcrete gypsum. Very rocky gypsum outcrop, with gentle - no slope and no dominant aspect, with skeletal, pale orange soils

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Acacia sclerosperma* subsp. *sclerosperma* | not scored | 1-2% |
| *Boerhavia coccinea* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | 5% |
| *Cleome viscosa* | not scored | <1% |
| *Enchylaena tomentosa* var. *tomentosa* | not scored | <1% |
| *Enneapogon caerulescens* | not scored | 1-2% |
| *Eragrostis dielsii* | not scored | 8% |
| *Euphorbia* sp. sterile (boop/tannensis?) | not scored | <1% |
| *Flaveria trinervia* | not scored | <1% |
| *Maireana pyramidata* | not scored | 1% |
| *Melaleuca glomerata* | not scored | <1% |
| *Neobassia astrocarpa* | not scored | <1% |
| *Rhagodia eremaea* | not scored | <1% |
| *Salsola australis* | not scored | <1% |
| *Santalum lanceolatum* | not scored | <1% |
| Scaevola collaris | not scored | 15% |
| *Senna artemisioides* subsp. *helmsii* | not scored | <1% |
| *Senna glaucifolia* | not scored | <1% |
| *Swainsona unifoliolata* | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT113

**Date established:** 5/09/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.42347909°S 119.2400701°E

**MGA** **Zone 50** 7518578.732 mN 730571.0774

**Location:** Central-west part of Fortescue Marsh, 16.3 km E of Mingah Well, 29 km NW of Marillana Homestead, 25.3 km ESE of Cowra Line Camp, 20.8 km WNW of Paroo Well, 23.7 km WSW of Cloudbreak Mine Village.

**Vegetation:** Very sparse shrubland of *Lawrencia helmsii* and occasional *Maireana* pyrimidata, over sparse shrubland of Scaevola collaris, Neobassia astrocarpa and *Frankenia ambita*.

**Site:** Gypsum flats at northern base of low (5 m) gypsum outcrop on extensive saline flood plain and lake bed with surface fragments of gypsum, calcrete. Very slightly rocky gypsum outcrop with skeletal, pale orange-brown, loamy sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Atriplex bunburyana* | not scored | <1% |
| *Atriplex codonocarpa* | not scored | <1% |
| *Boerhavia coccinea* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | <1% |
| *Eragrostis* desertorum | not scored | <1% |
| *Eragrostis dielsii* | not scored | 8-10% |
| *Frankenia ambita* | not scored | <1% |
| *Lawrencia helmsii* | not scored | 8-10% |
| *Maireana pyramidata* | not scored | <1% |
| *Neobassia astrocarpa* | not scored | 12-15% |
| *Salsola australis* | not scored | <1% |
| *Scaevola collaris* | not scored | 5-8% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | <1% |
| *Zygophyllum compressum* | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT114

**Date established:** 5/09/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.42394471°S 119.2426272°E

**MGA** **Zone 50** 730833.602 mE 7 7518523.233 mN

**Location:** Central-west part of Fortescue Marsh, 16.5 km E of Mingah Well, 28.8 km NW of Marillana Homestead, 25.6 km ESE of Cowra Line Camp, 20.5 km WNW of Paroo Well, 23.5 km SW of Cloudbreak Mine Village.

**Vegetation:** Mid-dense shrubland and grasses of Scaevola collaris, *Tecticornia indica* subsp. *bidens* and *Eragrostis dielsii*.

**Site:** Flats at western base of low (3-5 m), gypsum outcrop on extensive saline flood plain and lake bed Soil surface with cover of liverwort crust with surface fragments of calcrete, gypsum on shallow-deep, pale red-brown, loamy sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Eragrostis dielsii* | not scored | 15-20% |
| *Frankenia ambita* | not scored | <1% |
| *Neobassia astrocarpa* | not scored | <1% |
| *Nicotiana heterantha* | not scored | <1% |
| *Salsola australis* | not scored | <1% |
| *Scaevola collaris* | not scored | 10-15% |
| *Tecticornia auriculata* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 30-25% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT115

**Date established:** 6/09/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.39048725°S 119.1794313°E

**MGA** **Zone 50** 724380.325 mE 7522324.437 mN

**Location:** Central-west part of Fortescue Marsh, 18.4 km E of Cowra Line Camp, 15.1 km SE of Kardardarrie Well, 11.4 km ENE of Mingah Well, 35.7 km NW of Marillana Homestead, 27.7 km WSW of Cloudbreak Mine Village.

**Vegetation:** Isolated shrubs of *Muellerolimon salicorniaceum* and *Eremophila spongiocarpa* over very sparse shrubs of *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) and *Tecticornia indica* subsp. *bidens*, over mid-dense grassland and low shrubs of *Eragrostis dielsii* and *Frankenia ambita*.

**Site:** Extensive saline flood plain and lake bed with deep (>0.5m), pale or brown to red-brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cyperus bulbosus* | not scored | 2% |
| *Eleocharis papillosa* | not scored | <1% |
| *Eragrostis dielsii* | not scored | 30-35% |
| *Eremophila spongiocarpa* | not scored | <1% |
| *Frankenia ambita* | not scored | 15% |
| *Maireana luehmannii* | not scored | <1% |
| *Muellerolimon salicorniaceum* | not scored | 1% |
| *Nicotiana heterantha* | not scored | <1% |
| *Tecticornia auriculata* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 2% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | not scored | 1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT116

**Date established:** 6/09/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.42045239°S 119.202011°E

**MGA** **Zone 50** 713088.9146 mE 7527393.776 mN

**Location:** On NW part of Fortescue Marsh, 7.1 km ENE of Cowra Line Camp, 6.5 km SSW of Kardardarrie Well, 10.7 km N of Mingah Well, 37.6 km W of Cloudbreak Mine Village.

**Vegetation:** Very sparse shrubland of *Acacia synchronicia* over very sparse shrubs of *Tecticornia indica* subsp. *bidens* and *Senna* sp. Meekatharra (E. Bailey 1-26), over mid-dense grassland and sedges of *Eragrostis dielsii* and *Cyperus bulbosus*, with isolated plants of Flaveria trinervis and *Maireana luehmannii*.

**Site:** Extensive saline flood plain and lake bed with surface fragments of Goodiagarrie Hill-derived quartz & meta-siltstone on deep (>0.5m), red-brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Acacia synchronicia* | not scored | 8% |
| *Cucumis melo* | not scored | <1% |
| *Cyperus bulbosus* | not scored | 15-20% |
| *Dactyloctenium radulans* | not scored | 1% |
| *Eragrostis dielsii* | not scored | 50-55% |
| *Eremophila spongiocarpa* | not scored | <1% |
| *Flaveria trinervia* | not scored | 1% |
| *Frankenia ambita* | not scored | <1% |
| *Maireana luehmannii* | not scored | <1% |
| *Nicotiana heterantha* | not scored | <1% |
| *Senna* glutinosa subsp. glutinosa | not scored | <1% |
| *Senna* sp. Meekatharra (E. Bailey 1-26) | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT117

**Date established:** 8/09/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.34858436°S 119.1156079°E

MGA Zone 50 726657.1682 mE 7518971.915 mN

**Location:** Central-west part of Fortescue Marsh, 19.1 km SE of Kardardarrie Well, 12.8 km SSW of Minga Bore, 31.7 km NW of Marillana Homestead, 25km WNW of Paroo Well, 26.9 km WSW of Cloudbreak Mine Village.

**Vegetation:** Isolated plants of *Eremophila spongiocarpa*, over sparse shrubland and grasses of Scaevola collaris, *Eragrostis dielsii*, *Tecticornia indica* subsp. *bidens* and *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552), over sparse ground layer of *Nicotiana heterantha* and soil crust.

**Site:** Slight surface exposure of rocky deposits 500m northwest of low gypsum outcrop, in an extensive saline flood plain and lake bed Soil with crust of liverworts with surface fragments of calcrete. Slightly rocky gypsum outcrop with deep (>0.5m), red-brown, loamy sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Angianthus cyathifer* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | <1% |
| *Dysphania plantaginella* | not scored | <1% |
| *Eragrostis dielsii* | not scored | 10-15% |
| *Eremophila spongiocarpa* | not scored | <1% |
| *Flaveria trinervia* | not scored | <1% |
| *Frankenia ambita* | not scored | <1% |
| *Maireana luehmannii* | not scored | <1% |
| *Nicotiana heterantha* | not scored | <1% |
| Scaevola collaris | not scored | 8% |
| *Swainsona kingii* | not scored | <1% |
| Swainsona unifoliolata | not scored | <1% |
| *Tecticornia auriculata* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 30-35% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | not scored | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | 5-8% |
| Tribulus aff. eichlerianus | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT118

**Date established:** 8/09/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.35856067°S 119.1641423°E

MGA Zone 50 717872.5487 mE 7527058.862 mN

**Location:** On NW part of Fortescue Marsh, 7.5 km SSE of Kardardarrie Well, 11.8 km E of Cowra Line Camp, 10.8 km NNE of Mingah Well, 32.9 km W of Cloudbreak Mine Village, 43.6 km NW of Marillana Homestead, 43.9 km E of Auski Roadhouse and 128.3 km NNW of Newman, Pilbara

**Vegetation:** Mid-dense shrubland of *Tecticornia globulifera*, with isolated shrubs of *Tecticornia medusa*, *Muellerolimon salicorniaceum* and *Tecticornia auriculata*, over mid-dense grassland of *Eragrostis dielsii* and very sparse herbs and sedges of *Mimulus* aff *gracilis*, *Eleocharis papillosa* and *Cyperus bulbosus*.

**Site:** Extensive saline flood plain and lake bed with deep (>0.5m), red-brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cressa australis* | not scored | <1% |
| *Cyperus bulbosus* | not scored | 1% |
| *Eleocharis papillosa* | not scored | 2-5% |
| *Eleocharis papillosa* | not scored | 2-5% |
| *Eragrostis dielsii* | not scored | 50-60% |
| *Maireana luehmannii* | not scored | <1% |
| *Mimulus* aff *gracilis* | not scored | <1% |
| *Muellerolimon salicorniaceum* | not scored | <1% |
| *Nicotiana heterantha* | not scored | <1% |
| *Tecticornia auriculata* | not scored | <1% |
| *Tecticornia globulifera* | not scored | 30-35% |
| *Tecticornia medusa* | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT119

**Date established:** 9/09/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.34616065°S 119.0691361°E

**MGA** **Zone 50** 722856.6001 mE 7525882.974 mN

**Location:** On central-west of Fortescue Marsh, 16.6 km E of Cowra Line Camp, 11.5 km SE of Kardardarrie Well, 11.5 km WSW of Minga Bore, 28.2 km WSW of Cloudbreak Mine Village.

**Vegetation:** Very sparse shrubs of *Muellerolimon salicorniaceum* over mid-dense shrubland of *Tecticornia indica* subsp. *bidens*, over sparse herbfield and grasses of *Mimulus* aff. *gracilis*, Swainsonia tanamiensis and *Eragrostis dielsii*.

**Site:** Extensive saline flood plain and lake bed with deep (>0.5m), red-brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Atriplex flabelliformis* | not scored | <1% |
| *Eleocharis papillosa* | not scored | 50-60% when |
| *Eragrostis dielsii* | not scored | 5-8% |
| *Frankenia ambita* | not scored | <1% |
| *Heliotropium curassavicum* | not scored | <1% |
| *Maireana luehmannii* | not scored | <1% |
| *Mimulus* aff *gracilis* | not scored | 20% |
| *Muellerolimon salicorniaceum* | not scored | 2-5% |
| *Nicotiana heterantha* | not scored | 5-10% |
| *Swainsona tanamiensis* | not scored | 2% |
| *Tecticornia auriculata* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 5-10% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT120

**Date established:** 9/09/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.33962595°S 119.0358407°E

**MGA** **Zone 50** 709668.739 mE 7528164.169 mN

**Location:** On NW margin of Fortescue Marsh, 4.4 km NE of Cowra Line Camp, 7.4 km SW of Kardardarrie Well, 24.1 km W of Minga Bore, 41 km W of Cloudbreak Mine Village, 50.2 km NW of Marillana Homestead.

**Vegetation:** Isolated plants of mostly senesced *Acacia tetragonophylla* and *Acacia synchronicia*, over mid-dense shrubland of *Eremophila spongiocarpa*, *Tecticornia indica* subsp. *bidens*,*Paspalidium* aff *jubiflorum*, and occasional *Duma florulenta*, over dense low grassland and herbfield of *Cullen cinereum*, *Eragrostis dielsii* and *Flaveria trinervis*.

**Site:** Freshwater drainage (derived from stony alluvial plains) on margin of extensive saline flood plain and lake bed with surface fragments of Goodiagarrie Hill-derived quartz & meta-siltstone on deep (>0.5m), red-brown , loamy sand soils

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Abutilon fraseri* subsp. *fraseri* | not scored | <1% |
| *Acacia synchronicia* | not scored | <1% |
| *Acacia tetragonophylla* | not scored | <1% |
| *Atriplex flabelliformis* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | <1% |
| Cenchrus setiger | not scored | <1% |
| *Cucumis melo* | not scored | <1% |
| *Cullen cinereum* | not scored | 10-15% |
| *Cyperus bulbosus* | not scored | <1% |
| *Dactyloctenium radulans* | not scored | 1-2% |
| *Duma florulenta* | not scored | <1% |
| *Einadia nutans* subsp. *eremaea* | not scored | <1% |
| *Enchylaena tomentosa* var. *tomentosa* | not scored | <1% |
| *Enneapogon polyphyllus* | not scored | <1% |
| *Enteropogon ramosus* | not scored | <1% |
| *Eragrostis dielsii* | not scored | 30-35% |
| *Eremophila spongiocarpa* | not scored | 2% |
| *Euphorbia biconvexa* | not scored | <1% |
| *Flaveria trinervia* | not scored | 15% |
| *Frankenia ambita* | not scored | <1% |
| *Malvastrum americanum* | not scored | <1% |
| *Nicotiana heterantha* | not scored | <1% |
| *Paspalidium aff. jubiflorum* | not scored | 5-10% |
| *Pluchea rubelliflora* | not scored | <1% |
| *Ptilotus nobilis* subsp. *nobilis* | not scored | <1% |
| *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) | not scored | <1% |
| *Senna* sp. Meekatharra (E. Bailey 1-26) | not scored | <1% |
| Setaria verticillata | not scored | <1% |
| *Sida* sp. verrucose glands (F.H. Mollemans | not scored | <1% |
| *Streptoglossa decurrens* | not scored | <1% |
| *Streptoglossa liatroides* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 15-20% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT121

**Date established:** 10/09/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.35168055°S 119.0492987°E

**MGA** **Zone 50** 711037.0212 mE 7526810.431 mN

**Location:** On NW part of Fortescue Marsh, 5 km ENE of Cowra Line Camp, 7.7 km SSW of Kardardarrie Well, 22.8 km W of Minga Bore, 39.7 km W of Cloudbreak Mine Village, 48.3 km NW of Marillana Homestead.

**Vegetation:** Isolated shrubs of *Tecticornia indica* subsp. *bidens*, *Lawrencia helmsii* and *Eremophila spongiocarpa* over mid-dense grassland and subshrubs of Scaevola collaris, *Eragrostis dielsii*, *Maireana luehmanii* and *Neobassia astrocarpa*

**Site:** Extensive saline flood plain and lake bed with surface fragments of calcrete and gypsum crystals. Very slightly rocky calcrete outcrop with deep (>0.5m), red-brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Cyperus bulbosus* | not scored | <1% |
| *Dactyloctenium radulans* | not scored | <1% |
| Dysphania simulans | not scored | <1% |
| *Eragrostis dielsii* | not scored | 25% |
| *Eremophila spongiocarpa* | not scored | <1% |
| *Flaveria trinervia* | not scored | <1% |
| *Frankenia ambita* | not scored | <1% |
| *Lawrencia helmsii* | not scored | <1% |
| *Maireana luehmannii* | not scored | 8-10% |
| Neobassia astrocarpa | not scored | <1% |
| *Nicotiana heterantha* | not scored | <1% |
| Scaevola collaris | not scored | 2-3% |
| *Swainsona tanamiensis* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT122

**Date established:** 10/09/2014 **Date rescored:** not rescored

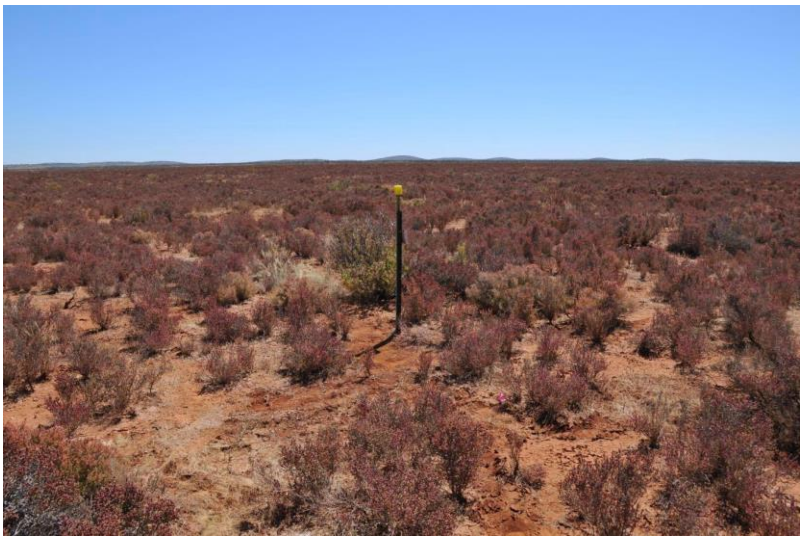
**Lat/Long (dd):** -22.349112°S 119.0484214°E

**MGA** **Zone 50** 710950.5231 mE 7527096.105 mN

**Location:** On NW part of Fortescue Marsh, 5 km ENE of Cowra Line Camp, 7.5 km SSW of Kardardarrie Well, 22.9 km W of Minga Bore, 39.8 km W of Cloudbreak Mine Village, 48.6 km NW of Marillana Homestead.

**Vegetation:** Isolated plants of *Eremophila spongiocarpa*, over mid-dense shrubs of *Tecticornia indica* subsp. *bidens* and *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552), over very sparse grasses and herbs of *Eragrostis dielsii* and *Dysphania simulans*.

**Site:** Extensive saline flood plain and lake bed with surface fragments of calcrete on shallow, red-brown- pale orange-brown, silty loam soils.



| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Angianthus cyathifer* | not scored | <1% |
| *Dactyloctenium radulans* | not scored | <1% |
| Dysphania simulans | not scored | <1% |
| *Eragrostis dielsii* | not scored | 2-5% |
| *Eremophila spongiocarpa* | not scored | <1% |
| *Flaveria trinervia* | not scored | <1% |
| *Frankenia ambita* | not scored | <1% |
| *Maireana luehmannii* | not scored | <1% |
| *Nicotiana heterantha* | not scored | <1% |
| Scaevola collaris | not scored | <1% |
| *Swainsona kingii* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 35-40% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | not scored | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | 8% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT123

**Date established:** 10/09/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.34103528°S 119.0398012°E

**MGA** **Zone 50** 710074.6313 mE 7528002.58 mN

**Location:** On NW margin of Fortescue Marsh, 4.6 km NE of Cowra Line Camp, 7.2 km SW of Kardardarrie Well, 23.7 km W of Minga Bore, 40.6 km W of Cloudbreak Mine Village. 49.8 km NW of Marillana Homestead.

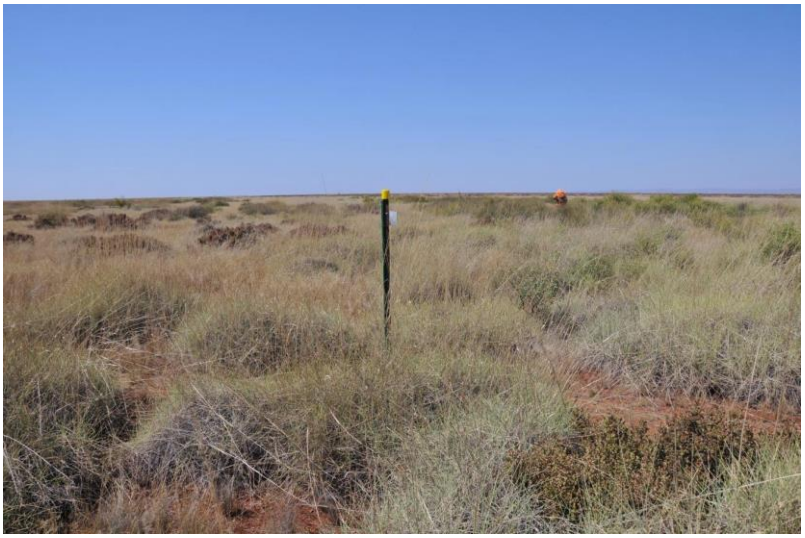
**Vegetation:** Sparse shrubs of *Eremophila spongiocarpa*, *Tecticornia indica* subsp. *bidens* and *Senna* sp. Meekatharra (E. Bailey 1-26), over mid-dense grassland and shrubs of *Eragrostis dielsii*, *Dissocarpus paradoxus* and *Eremophea spinosa*.

**Site:** Margin of calcrete plain and margin of extensive saline flood plain and lake bed with surface fragments of calcrete. Very slightly rocky calcrete outcrop with shallow, pale orange-brown to red-brown, loamy sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Acacia synchronicia* | not scored | <1% |
| *Acacia tetragonophylla* | not scored | <1% |
| *Atriplex bunburyana* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | <1% |
| *Convolvulus clementii* | not scored | <1% |
| *Cucumis melo* | not scored | <1% |
| *Cullen cinereum* | not scored | 5% patchy |
| *Cyperus bulbosus* | not scored | <1% |
| *Dactyloctenium radulans* | not scored | <1% |
| *Dissocarpus paradoxus* | not scored | 2% |
| *Enchylaena tomentosa* var. *tomentosa* | not scored | <1% |
| *Enteropogon ramosus* | not scored | <1% |
| *Eragrostis dielsii* | not scored | 40-50% |
| *Eremophea spinosa* | not scored | 10-12% |
| *Eremophila* forrestii subsp. forrestii | not scored | <1% |
| *Eremophila spongiocarpa* | not scored | 12% |
| Euphorbia trigonosperma | not scored | <1% |
| *Euphorbia vaccaria* var. *erucoides* | not scored | <1% |
| *Flaveria trinervia* | not scored | <1% |
| *Frankenia ambita* | not scored | <1% |
| *Goodenia forrestii* | not scored | <1% |
| *Maireana pyramidata* | not scored | <1% |
| *Maireana* triptera | not scored | <1% |
| *Ptilotus nobilis* subsp. *nobilis* | not scored | <1% |
| *Senna* glutinosa subsp. chatelainiana | not scored | <1% |
| *Senna* sp. Meekatharra (E. Bailey 1-26) | not scored | <1% |
| *Sida fibulifera* | not scored | <1% |
| *Solanum morrisonii* | not scored | <1% |
| *Sporobolus australasicus* | not scored | <1% |
| *Streptoglossa bubakii* | not scored | <1% |
| *Streptoglossa decurrens* | not scored | <1% |
| *Streptoglossa liatroides* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 12% |
| *Tecticornia indica* subsp. *leiostachya* | not scored | <1% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | 1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT124



**Date established:** 12/09/2014 **Date rescored:** not rescored

**Lat/Long (dd):**-22.31779017°S 119.1846804°E

MGA Zone 50 7530367.676 mN725037.7465 mE

**Location:**On NW margin of Fortescue Marsh, 11.1 km ESE of Kardardarrie Well, 8.7 km W of Minga Bore, 19.4 km ENE of Cowra Line Camp, 25.5 km W of Cloudbreak Mine Village, 41.8 km NNW of Marillana Homestead.

**Vegetation:** Sparse shrubs of *Acacia synchronicia*, *Duma florulenta*, *Triodia longiceps*, *Tecticornia indica* subsp. *bidens* and *Acacia sclerosperma* subsp. *sclerosperma*, over mid-dense grassland of *Eragrostis dielsii* and *Sporobolus mitchellii*, and isolated plants of *Sida fibulifera*, *Solanum morrisonii* and *Cullen cinereum*.

**Site:** Freshwater drainage on margin of extensive saline flood plain and calcret plain with surface fragments of BIF and associated metasediments from Chichester Range on shallow, red-brown, silty loam soils

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Abutilon* cryptopetalum | not scored | <1% |
| *Acacia sclerosperma* subsp. *sclerosperma* | not scored | <1% |
| *Acacia* victoriae | not scored | 2-5% |
| *Alternanthera denticulata* | not scored | <1% |
| *Cressa australis* | not scored | <1% |
| Cucumis variabilis | not scored | <1% |
| *Cullen cinereum* | not scored | <1% |
| *Dactyloctenium radulans* | not scored | <1% |
| *Duma florulenta* | not scored | 5-8% |
| *Einadia nutans* subsp. *eremaea* | not scored | <1% |
| *Enteropogon ramosus* | not scored | <1% |
| *Eragrostis* cumingii | not scored | <1% |
| *Eragrostis dielsii* | not scored | 50-60% |
| *Eremophila spongiocarpa* | not scored | <1% |
| Goodenia sp. East Pilbara (A.A. Mitchell PRP | not scored | <1% |
| *Malvastrum americanum* | not scored | <1% |
| *Paspalidium aff. jubiflorum* | not scored | <1% |
| *Pluchea rubelliflora* | not scored | <1% |
| *Portulaca filifolia* | not scored | <1% |
| *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) | not scored | <1% |
| *Sclerolaena cuneata* | not scored | <1% |
| Setaria verticillata | not scored | <1% |
| *Sida fibulifera* | not scored | <1% |
| *Solanum morrisonii* | not scored | <1% |
| *Sporobolus mitchellii* | not scored | 15-20% |
| *Tecticornia indica* subsp. *bidens* | not scored | 2-5% |
| *Tecticornia indica* subsp. *leiostachya* | not scored | <1% |
| *Trianthema turgidifolium* | not scored | <1% |
| *Triodia longiceps* | not scored | 2-5% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT125

**Date established:** 12/09/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.36655784°S 119.3467719°E

**MGA** **Zone 50** 741656.6381 mE 7524715.351 mN

**Location:** On N margin of Fortescue Marsh, 11.1 km SW of Cloudbreak Mine Village, 16.7 km NNW of Paroo Well, 30.2 km NNW of Marillana Homestead, 35.4 km E of Cowra Line Camp, 9.4 km ESE of Minga Bore.

**Vegetation:** Sparse tree mallee and tall shrubland of Eucalyptus victrix, *Acacia* aptaneura and *Acacia* coriacea subsp, pendans, over sparse shrubland of *Melaleuca glomerata*, *Acacia* aptaneura, *Acacia tetragonophylla*, *Acacia sclerosperma* subsp. *sclerosperma*, *Acacia synchronicia*, *Scaevola spinescens* and *Senna* glutinosa subsp. glutinsonsa, over dense grassland and shrublands of *Cenchrus ciliaris*, *Eremophila spongiocarpa, Tecticornia indica* subsp. *bidens, Eragrostis dielsii*, *Eragrostis cummingii, Flaveria trinervis, Sida fibulifera, Cullen cinereum* and *Paspalidium* aff. *jubiflorum*.

**Site:** Freshwater drainage (derived from stony alluvial plains) on margin of extensive saline flood plain and lake bed with surface fragments of BIF and associated metasediments from Chichester Range on deep (>0.5m), silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Abutilon* cryptopetalum | not scored | <1% |
| *Abutilon* fraseri subsp. fraseri | not scored | <1% |
| *Abutilon lepidum* | not scored | <1% |
| *Acacia* aptaneura | not scored | 5% |
| *Acacia* coriacea subsp. pendens | not scored | <1% |
| *Acacia sclerosperma* subsp. *sclerosperma* | not scored | <1% |
| *Acacia synchronicia* | not scored | <1% |
| *Acacia tetragonophylla* | not scored | 5% |
| *Atriplex flabelliformis* | not scored | <1% |
| Capparis spinosa var. nummularia | not scored | <1% |
| *Cenchrus ciliaris* | not scored | 10-15% |
| Cenchrus setiger | not scored | 10-15% |
| *Chloris pumilio* | not scored | <1% |
| *Convolvulus clementii* | not scored | <1% |
| Cucumis variabilis | not scored | <1% |
| *Cullen cinereum* | not scored | <1% |
| *Dactyloctenium radulans* | not scored | <1% |
| *Duma florulenta* | not scored | <1% |
| *Einadia nutans* subsp. *eremaea* | not scored | <1% |
| *Enchylaena tomentosa* var. *tomentosa* | not scored | <1% |
| *Enteropogon ramosus* | not scored | <1% |
| *Eragrostis* cumingii | not scored | 5% |
| *Eragrostis dielsii* | not scored | 40% |
| *Eremophila spongiocarpa* | not scored | 2-5% |
| Eucalyptus victrix | not scored | 10-15% |
| *Evolvulus alsinoides* var. *villosicalyx* | not scored | <1% |
| *Flaveria trinervia* | not scored | 1-2% |
| *Gomphrena affinis* subsp. *pilbarensis* | not scored | <1% |
| *Maireana* triptera | not scored | <1% |
| *Malvastrum americanum* | not scored | <1% |
| *Melaleuca glomerata* | not scored | 5-8% |
| Melhania oblongifolia | not scored | <1% |
| *Panicum decompositum* | not scored | <1% |
| *Paspalidium aff. jubiflorum* | not scored | 2-3% |
| *Pluchea dunlopii* | not scored | <1% |
| *Pluchea rubelliflora* | not scored | <1% |
| Pluchea tetranthera | not scored | <1% |
| *Rhagodia eremaea* | not scored | <1% |
| *Rhynchosia australis* | not scored | <1% |
| *Scaevola spinescens* | not scored | <1% |
| *Senna artemisioides* subsp. *helmsii* | not scored | <1% |
| *Senna* glutinosa subsp. glutinosa | not scored | <1% |
| *Senna* glutinosa subsp. glutinosa | not scored | <1% |
| Setaria verticillata | not scored | <1% |
| *Sida fibulifera* | not scored | <1% |
| *Solanum morrisonii* | not scored | <1% |

| | | |
|---|---|---|
| *Sporobolus caroli* | not scored | <1% |
| *Streptoglossa bubakii* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 5-8% |
| *Trianthema triquetrum* | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT126

**Date established:** 12/09/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.34411705°S 119.2813151°E

MGA Zone 50 734951.3689 mE 7527304.437 mN

**Location:** On N margin of Fortescue Marsh, 2.7 km SSE of Minga Bore, 16.1 km WSW of Cloudbreak Mine Village, 28.8 km E of Cowra Line Camp, 21.4 km ESE of Kardardarrie Well, 34.6 km NNW of Marillana Homestead.

**Vegetation:** Very sparse shrubland of *Acacia synchronicia* and *Eremophila youngii* subsp. *lepidota*, with occasional shrubs of *Melaleuca glomerata*, over mid-dense shrubland of *Atriplex bunburyana*, *Eremophila spongiocarpa* and Lepidium platypetalum, over sparse low shrubs and grasses of *Atriplex codonocarpa*, *Trianthema turgidifolium*, *Eragrostis*

**Site:** Ephemeral creekline and alluvial fan on edge of saline flood plain with surface fragments of BIF and associated metasediments from Chichester Range on deep (>0.5m), red-brown, loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Acacia synchronicia* | not scored | 2-5% |
| *Atriplex bunburyana* | not scored | 10-15% |
| *Atriplex codonocarpa* | not scored | <1% |
| *Boerhavia coccinea* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | <1% |
| *Dactyloctenium radulans* | not scored | <1% |
| *Enchylaena tomentosa* var. *tomentosa* | not scored | <1% |
| *Enteropogon ramosus* | not scored | <1% |
| *Eragrostis dielsii* | not scored | 2% |
| *Eremophila spongiocarpa* | not scored | 2-5% |
| *Eremophila youngii* subsp. *lepidota* | not scored | <1% |
| *Lawrencia densiflora* | not scored | <1% |
| Lepidium platypetalum | not scored | 1-2% |
| *Maireana amoena* | not scored | <1% |
| *Maireana carnosa* | not scored | <1% |
| *Maireana pyramidata* | not scored | <1% |
| *Maireana* triptera | not scored | <1% |
| *Melaleuca glomerata* | not scored | <1% |
| *Portulaca filifolia* | not scored | <1% |
| *Salsola australis* | not scored | <1% |
| *Sclerolaena cuneata* | not scored | <1% |
| *Sclerolaena diacantha* | not scored | <1% |
| *Sporobolus australasicus* | not scored | <1% |
| *Trianthema triquetrum* | not scored | <1% |
| *Trianthema* turgidifolium | not scored | <1% |
| *Triodia longiceps* | not scored | <1% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT127

**Date established:** 14/09/2014 **Date rescored:** not rescored

**Lat/Long (dd):** -22.31924987°S 119.1843845°E

**MGA** **Zone 50** 725004.9077 mE 7530206.458 mN

**Location:** On NW margin of Fortescue Marsh, 11.1 km ESE of Kardardarrie Well, 8.7 km W of Minga Bore, 19.4 km ENE of Cowra Line Camp, 25.5 km W of Cloudbreak Mine Village, 41.7 km NNW of Marillana Homestead.

**Vegetation:** Mid-dense shrubland of *Eremophila spongiocarpa*, *Tecticornia indica* subsp. *bidens*, *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) and *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) over very sparse grassland and herbs of *Eragrostis dielsii*, *Swainsona kingii* and *Flaveria trinervis*.

**Site:** Stony flats on margin of extensive flood plain and lake bed with surface fragments of BIF and associated metasediments from Chichester Range on deep (>0.5m), red-brown, loamy sand soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Dactyloctenium radulans* | not scored | <1% |
| *Eragrostis dielsii* | not scored | <1% |
| *Eremophila spongiocarpa* | not scored | 15-20% |
| *Flaveria trinervia* | not scored | <1% |
| Iseilema vaginiflorum | not scored | <1% |
| *Maireana luehmannii* | not scored | <1% |
| *Muellerolimon salicorniaceum* | not scored | 1-2% |
| *Swainsona kingii* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 35-40% |
| *Tecticornia* sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063) | not scored | 5-8% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | 8% |

Appendix 2: Flora and Vegetation of the Fortescue Marsh.

## Site FORT128

**Date established:** 14/09/2014 **Date rescored:** not rescored

Lat/Long (dd WGS): -22.32376512°S 119.2009759°E

**MGA** **Zone 50** 726707.2313mE 7529681.54 mN

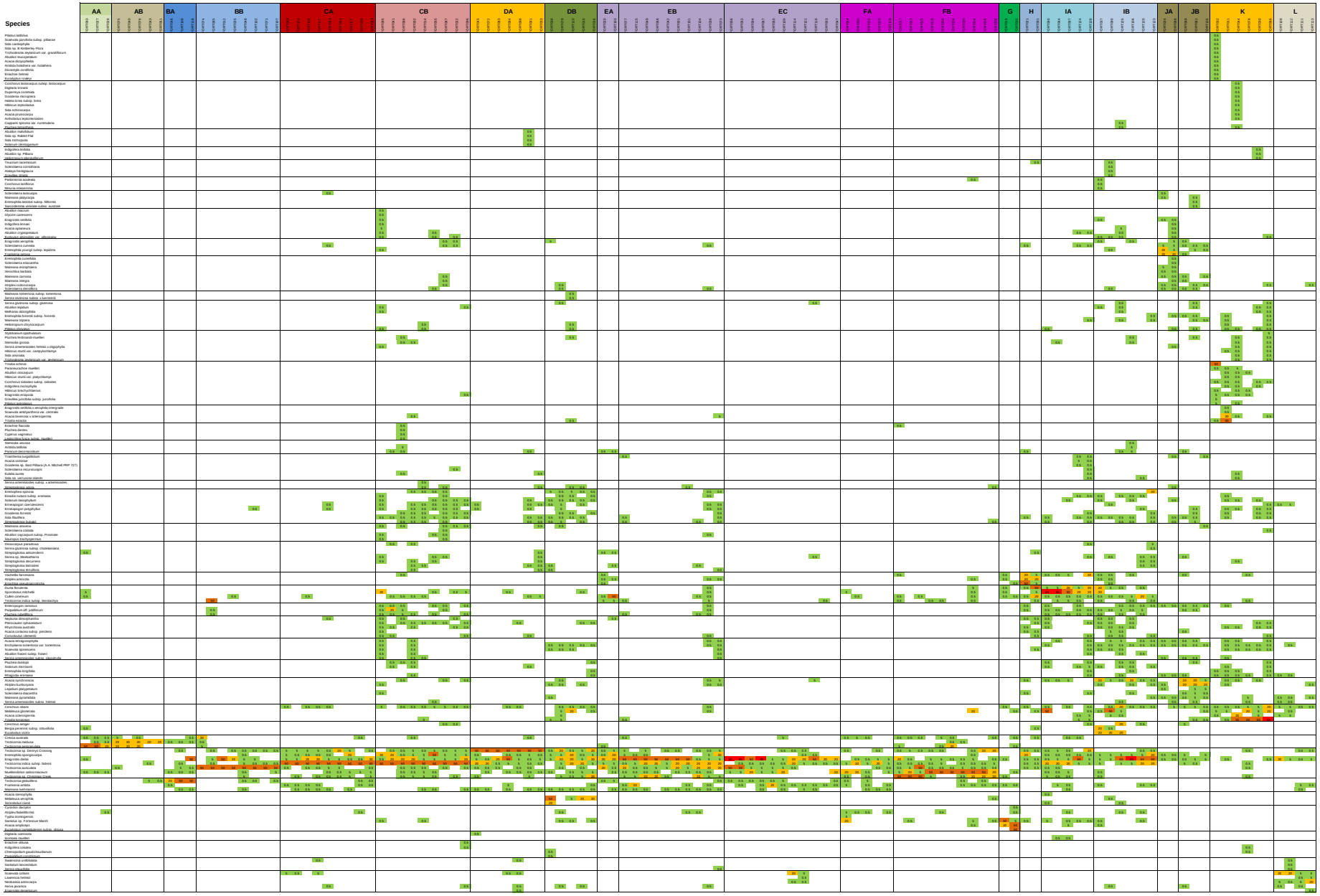
**Location:** On NW margin of Fortescue Marsh, 7 km W of Minga Bore, 12.9 km ESE of Kardardarrie Well, 20.9 km ENE of Cowra Line Camp, 23.9 km W of Cloudbreak Mine Village, 40.4 km NNW of Marillana Homestead.

**Vegetation:** Sparse shrubland of *Acacia* sclerospera, *Acacia tetragonophylla* and *Vachellia farnesiana*, over mid-dense shrubland and hummock grasses of *Duma florulenta*, *Tecticornia indica* subsp. *bidens*, *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) and *Triodia longiceps*, over sparse shrubs and grasses of *Solanum morrisonii*,

**Site:** Freshwater drainage on margin of extensive saline flood plain and calcret plain with surface fragments of BIF and associated metasediments from Chichester Range on deep (>0.5m), red-brown, silty loam soils.

| Species | Cover 2013 | Cover 2014 |
|---|---|---|
| *Abutilon* cryptopetalum | not scored | <1% |
| *Abutilon* fraseri subsp. fraseri | not scored | <1% |
| *Acacia sclerosperma* subsp. *sclerosperma* | not scored | 8-10% |
| *Acacia tetragonophylla* | not scored | <1% |
| *Acacia* victoriae | not scored | <1% |
| *Alternanthera denticulata* | not scored | <1% |
| *Boerhavia* cf. *coccinea* | not scored | <1% |
| *Cenchrus ciliaris* | not scored | <1% |
| Cenchrus setiger | not scored | <1% |
| *Chloris pectinata* | not scored | <1% |
| *Convolvulus clementii* | not scored | <1% |
| *Cullen cinereum* | not scored | <1% |
| Cyperus squarrosus | not scored | <1% |
| *Dactyloctenium radulans* | not scored | <1% |
| *Dissocarpus paradoxus* | not scored | <1% |
| *Duma florulenta* | not scored | 10-15% |
| *Einadia nutans* subsp. *eremaea* | not scored | <1% |
| *Enchylaena tomentosa* var. *tomentosa* | not scored | <1% |
| *Eragrostis* cumingii | not scored | <1% |
| *Eragrostis dielsii* | not scored | 5-8% |
| *Eragrostis leptocarpa* | not scored | 8% |
| *Eremophila longifolia* | not scored | <1% |
| *Eremophila spongiocarpa* | not scored | <1% |
| Eulalia aurea | not scored | <1% |
| Eulalia aurea | not scored | <1% |
| *Goodenia forrestii* | not scored | <1% |
| Goodenia sp. East Pilbara (A.A. Mitchell PRP | not scored | <1% |
| *Maireana* triptera | not scored | <1% |
| *Malvastrum americanum* | not scored | <1% |
| *Melaleuca glomerata* | not scored | <1% |
| *Paspalidium aff. jubiflorum* | not scored | <1% |
| *Pluchea dunlopii* | not scored | <1% |
| *Pluchea rubelliflora* | not scored | <1% |
| *Pluchea rubelliflora* | not scored | <1% |
| *Pterocaulon sphacelatum* | not scored | <1% |
| *Rhagodia eremaea* | not scored | <1% |
| *Samolus* sp. Fortescue Marsh (A. Markey & R. Coppen FM 9702) | not scored | <1% |
| *Scaevola spinescens* | not scored | <1% |
| *Sclerolaena cuneata* | not scored | <1% |
| *Sclerolaena diacantha* | not scored | <1% |
| *Sclerolaena* recurvicuspis | not scored | <1% |
| *Senna* sp. Meekatharra (E. Bailey 1-26) | not scored | <1% |
| Setaria verticillata | not scored | <1% |
| Setaria verticillata | not scored | <1% |
| *Sida fibulifera* | not scored | <1% |
| *Sida* sp. verrucose glands (F.H. Mollemans | not scored | <1% |
| *Solanum morrisonii* | not scored | 5% |
| *Sporobolus australasicus* | not scored | <1% |
| *Sporobolus mitchellii* | not scored | 20-25% |
| *Streptoglossa bubakii* | not scored | <1% |
| *Tecticornia indica* subsp. *bidens* | not scored | 8-10% |
| *Tecticornia* sp. Dennys Crossing (K.A. Shepherd & J. English KS 552) | not scored | 10-15% |

| | | |
|---|---|---|
| *Trianthema triquetrum* | not scored | <1% |
| *Trianthema* turgidifolium | not scored | <1% |
| *Triodia longiceps* | not scored | 8% |
| *Vachellia farnesiana* | not scored | 10-15% |


Species
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